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This research project was undertaken with the overall objective of analyzing state water rights law in order to determine its possible impact on systems of land application of wastewater. It was determined that most states do not have regulations specifically controlling land application of wastewater, and that an analysis would have to be undertaken of basic state water law principles which, for the most part, have been developed with entirely different uses of water in mind. There is a basic distinction between the "riparian" states of the East, which emphasize the right of each riparian landowner along a watercourse to the use of the water, and the "appropriation" states of the West, which emphasize that the right inures to the prior user of the water. For the most part, state water rights law was found to contain enough flexibility, through its emphasis on encouraging "reasonable" uses of water, to enable land application systems to operate free from legal uncertainty.

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LAND APPLICATION OF WASTEWATER AND STATE WATER LAW: AN OVERVIEW Volume I

by

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Contract No. EPA-IAG-D5-0799

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This study was conducted
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FOREWORD

The Environmental Protection Agency was established to coordinate administration of the major Federal programs designed to protect the quality of our environment.

An important part of the agency's effort involves the search for information about environmental problems, management techniques and new technologies through which optimum use of the nation's land and water resources can be assured and the threat pollution poses to the welfare of the American people can be minimized.

EPA's Office of Research and Development conducts this search through a nationwide network of research facilities. As one of these facilities, the Robert S. Kerr Environmental Research Laboratory is responsible for the management of programs including the development and demonstration of soil and other natural systems for the treatment and management of municipal wastewaters.

Although land application of municipal wastewaters has been practiced for years, there has been a growing and widespread interest in this practice in recent years. The use of land application received major impetus with the passage of the 1972 amendments to the Federal Water Pollution Control Act. Subsequent revisions in the Environmental Protection Agency construction grants regulations made the use of land application mandatory if it was the most cost effective alternative and satisfied other applicable requirements. As land application became more widespread, a growing need developed to define the legal aspects of this technology, particularly with respect to the water rights laws of the various states. The purpose of this report is to satisfy this need.

This report contributes to the knowledge essential if the EPA is to meet the requirements of environmental laws that it establish and enforce pollution control standards which are reasonable, cost effective and provide adequate protection for the American public.

William Galegar

William C. Galegar
Director
Robert S. Kerr Environmental Research Laboratory

PREFACE

Land application of wastewater for irrigation and other purposes is becoming an increasingly popular method of sewage treatment and disposal. In a time of intensified concern with water quality, care must be taken to insure that land application systems are planned and operated consistently with applicable water quality standards.

While Federal laws and regulations pertaining to preservation of water resources will have application to land application systems, another source of legal control not yet intensively studied is the water law policies of the states in which land application systems are being or will be developed. While some states have specific regulations pertaining to land application, most do not. In this latter group of states, it becomes necessary to analyze the possible impacts a land application system might have on the waters of the state, and to determine general water law framework.

The purposes of this report, therefore, are: (1) to define the legal questions which pertain to land application of wastewater in the context of state water rights law; (2) to explain the two basic theories of water law prevalent in the United States; and (3) to identify the particular aspects of each water law doctrine that may influence treatment system design and operation. Occasional reference will be made to the laws of particular states, although detailed description of the variations of the law in each of the states selected for in-depth study will be undertaken in Volume II of this report. It is intended that this report shall serve as the basis from which the more specific state analyses shall proceed.

ABSTRACT

This research project was undertaken with the overall objective of analyzing state water rights law in order to determine its possible impact on systems of land application of wastewater.

It was determined that most states do not have regulations specifically controlling land application of wastewater, and that an analysis would have to be undertaken of basic state water law principles which, for the most part, have been developed with entirely different uses of water in mind.

Several basic dichotomies were noted which could have some impact on the treatment of land application systems in different locations. There is a basic distinction between the "riparian" states of the East, which emphasize the right of each riparian landowner along a watercourse to the use of the water, and the "appropriation" states of the West, which emphasize that the right inures to the prior user of the water. In addition, most states in both the riparian and appropriation categories distinguish between "natural watercourses," "surface water," and "groundwater," with different legal considerations and results frequently occurring in different categories of water within the same state.

Occasional abstract legal requirements of absolute purity of waters were found which, if literally applied, could pose adverse implications for any innovative uses of water, including land application. For the most part, state water rights law was found to contain enough flexibility, through its emphasis on encouraging "reasonable" uses of water, to enable land application systems to operate free from legal uncertainty.

This report was submitted in fulfillment of Contract No. EPA-IAG-D5-0799 by the Economic Research Service, U.S. Department of Agriculture, under the sponsorship of the U.S. Environmental Protection Agency. The report covers the period June 30, 1975, to September 30, 1977, and work was completed as of July 31, 1977. Research for the report was performed at the School of Natural Resources and Law School, University of Wisconsin-Madison, pursuant to Cooperative Agreement No. 12-17-06-8-1423-X between the University of Wisconsin and the Economic Research Service, U.S. Department of Agriculture.

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SECTION 1

INTRODUCTION

The purpose of this report is to define the legal questions which pertain to land application of wastewater in the context of private water rights law, explain the two basic theories of water law prevalent in the United States, the riparian and appropriation theories, and identify the particular aspects of each doctrine that influence treatment system design and operation.

Despite intense current interest, land application of sewage effluent is in fact an ancient practice, with instances occurring in Athens, Greece, as early as the first and second centuries B.C. In medieval Europe, particularly in Germany, extensive land application of sewage promoted the growth of grain and vegetable crops. By the nineteenth century, the use of sewage on farmland had spread throughout continental Europe and England, and was even occurring in the colonies of the various European countries (1).

The method most widely used for spreading effluent at that time was irrigation; this proved to the the simplest way of disposal of large quantities of sewage. However, one drawback with the use of sewage in this manner was the fact that this was generally the only treatment the waste received. Hence, any mismanagement in the use of waste effluent on farmland led to crop failure and the creation of a disease-ridden nuisance. Despite these apparent drawbacks in the use of raw sewage, well managed farms frequently produced twice the yield of conventional farms in the same vicinity.

The United States began to dispose of sewage effluent on land during the late nineteenth century. The first use of waste effluent was for irrigation purposes, but by the early twentieth century groundwater recharge projects had become an alternative use in the semi-arid regions of the Southwest. During this time raw sewage began to receive preliminary treatment, of which screening and settling were the predominant features, before being applied to the land. By 1899 land disposal sites were in existence in 20 states. However, during the first half of the twentieth century, many of the land disposal sites in the Eastern States were abandoned because of population pressure and increased land values (2).

As the land disposal method of waste treatment moved further westward, variations of the purpose of this practice began to occur as knowledge and technology caught up with the waste disposal demands of a highly industrialized society. Land disposal systems that were limited to simple irrigation techniques during the 1930's developed into new and more sophisticated techniques during the early 1950's.

Land application methods presently in use can be classified into three main groups: irrigation, overland-flow or spray-runoff, and rapid infiltration (2). Before any one of these methods is implemented, the complex ecological systems that may be affected must be taken into consideration. Thus, unlike the old methods that viewed the land only as a dumping site, the new approaches attempt to integrate the particular method with the geological, climatologic, and hydrologic limitations of the particular site and the surrounding locality.

The irrigation method involves the controlled discharge of effluent, by spraying or surface spreading, onto land to support plant growth. It can be broken down into three different types of application--spraying, ridge and furrow method, and flooding. Use of one or another of these three alternatives will depend upon many factors, including the type of crop, the climate, and the topography of the region. The irrigation method has been developed for municipal wastewater and a variety of industrial wastewaters, including food processing wastes, pulp and paper discharges, tannery wastes, animal feedlot effluent, and chemical discharges (2).

The overland-flow method involves the controlled discharge, by spraying or other means, of effluent onto the land with a large portion of the wastewater appearing as runoff. The rate of application is measured in inches per week, and the wastewater travels in a sheet flow down the grade or slope. The most obvious characteristic of this particular method is the sheet flow of effluent over a sloping service area, usually 2 to 6 percent (2).

The rapid infiltration method, frequently used for groundwater recharge, involves the discharge of a large quantity of effluent onto land which has been chosen for its relatively high infiltration capacity. This particular method utilizes the same filtration technique employed in sewage treatment facilities and combines two functions, treatment and disposal, into one operation (2).

As land application of wastewater for irrigation and other purposes becomes increasingly more popular, each of the three application methods raises certain legal questions. In addition, each aspect of the typical land disposal system--(1) transmission of wastewater from treatment plants to storage lagoons; (2) holding effluents in lagoons until application to the land; (3) application; and (4) subsequent possible drainage into watercourses, groundwaters or surface water--presents certain unique legal problems.

The law will interact with land application of wastewater in several ways. First, Federal water pollution control legislation, while not directly concerned with land application until 1972, now includes certain specific provisions that tends to encourage land treatment of wastewater (3). The Federal Water Pollution Control Act Amendments of 1972 authorize Federal construction grants to state and local agencies to assist in the development of facilities for recycling potential sewage pollutants through agricultural and forestry production, reclamation of wastewater, and disposal of sludges in a manner not harmful to the environment (4).

Second, state-level legal and institutional problems will vary from state

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to state. Some, such as Arizona, Arkansas, Colorado, Georgia, New Mexico, Texas, and Wisconsin, have specific regulations pertaining to land application of wastewater (5); others have more general regulations that may include this process, intentionally or unintentionally, as part of a larger regulatory scheme (6). Yet others have nothing at all directly in point. Moreover, even in those states which have pertinent regulations, there is considerable variance in their coverage of questions such as pre-treatment methods to be used, manner of wastewater application, characteristics of useable wastewater, and uses to which wastewater may be put.

This report is concerned primarily with the legal problems that may be encountered in the final--or drainage--stage of land application systems. Drainage patterns can be affected by many factors, including land preparation, methods of wastewater application, soil characteristics, slope, spacing of irrigation equipment, cover crops, buffer zones, and climatic conditions. But in any situation, the land application of wastewaters--much of which had previously been discharged into natural watercourses--will have several effects.

First, land application will alter the flow pattern of the body of water into which wastes would have been discharged in the absence of the land application system. The alteration may increase the quality of the body of water in question, while diminishing the quantity of its flow.

Second, land application may cause diversion of some surface waters, because wastes now being processed for on-land application may previously have been carried away by the flow of surface waters.

Third, trace contaminants may remain on the land after application, and may either seep into underlying groundwater supplies, drain into a lake or stream, or be carried off the appliation site with surface waters. In each of these situations adjoining landowners might have a recognizable legal claim for pollution of the water.

These varying effects will raise potential legal problems under the water law of each state where a land application system is located. Analysis is complicated by the fact that most states have different legal structures for different classifications of water, with the result that apparently similar legal questions can receive widely divergent answers, depending on whether the affected water is characterized as a "natural watercourse," "groundwater," or "surface water".

It is difficult to provide a general description of water law because the subject is subdivided into numerous categories. At the outset, most states divide their basic law of water into three categories--natural watercourses, groundwater (or percolating water), and surface waters. The placing of a particular body of water into one category or another is often crucial to the outcome of a case, as the same state often has rules of conduct that vary widely from one type of water to another. Hydrologists have long noted that the legal classifications are arbitrary and do not bear any relation to known hydrologic facts (7). Indeed, early legal cases creating the distinctions acknowledged that the reason for the difference in legal treatment (between

surface and sub-surface water, for example) lay not in the fact of the water's location or hydrological characteristic, but in the differing degree of available knowledge about the water's existence, quality, and volume of flow (8). For example, since a landowner could see the harm done to adjoining landowners if he diverted or polluted a visible watercourse, liability was much more likely to ensue than in a case of diversion or pollution of groundwaters.

As knowledge has advanced to the point that the location, recharge rate and other characteristics of groundwater can be ascertained with substantial accuracy, it seems that the legal distinctions created in a prior century should be replaced by a more general body of water law. In fact, there is a gradual tendency to apply an all-encompassing doctrine of "reasonable use" to judge all proposed uses of water despite the type of water involved. The trend, however, is so gradual, and the basic three-part division so well established, that each legal "type" of water must be discussed separately.

In addition to the above division, other divisions further complicate the subject. The most important is the distinction, occurring originally in the "natural watercourse" area, between the "riparian" theory prevalent in the Eastern States and the "appropriation" theory that has either supplanted or wholly replaced the riparian theory in the 17 contiguous Western States and Alaska. Under the riparian theory the right to use water is based on ownership of land on the bank of a watercourse, while no such requirement exists for the appropriation theory. Use under this theory is based on a prior appropriation of the water (9). The dichotomy between the two systems of allocating water rights is of such significance that each system must be treated separately.

SECTION 2

CONCLUSIONS

The water law of most states is favorable to land application of wastewater, although there are occasional uncertainties caused by the fact that many states have no statutes, regulations, or even judicial decisions involving the unique aspects of land application.

The position of land application systems is particularly strong in eastern, riparian states. There could be legal consequences in most of these states for polluting any of the "types" of water--natural watercourses, surface waters, or groundwater. However, this risk is quite small and would, at worst, involve relatively small amounts of money. In addition, given the riparian states' emphasis on protecting "reasonable" uses, it is almost inconceivable that a land application system would be judicially enjoined or otherwise prevented from operating because of its anticipated effects on drainage patterns or because of any trace pollution that might ensue. If any nearby landowner tried to enjoin the system's operation, the system would have several strong "equitable" defenses with which to defeat such an action.

The legal position of land application systems is not as strong under the Western States' appropriation doctrine. The principal reason for this difference is because in most of the Eastern States other individuals, particularly nearby landowners, will have enforceable rights only in natural watercourses, and an application system, if it will have any impact on water quality or drainage at all, will have its principal effect on surface water drainage patterns. In the Western States, however, appropriative rights will frequently cover surface waters, either directly or indirectly through rights in the watercourse to which those waters drain. Consequently, operators of land application systems in the Western States cannot eliminate the risk of liability for dispersal of pollutants by the simple expedient of retaining all surface waters on the application site, as they can do in riparian jurisdictions. In Western States there is always the risk, the imminence of which will vary with the uses being made of the water in the area of each particular application site, that interference with surface water drainage may impede another appropriator's vested right. Although this is unlikely to lead to the system's being enjoined from operation, it does make the possibility of successful damage claims more likely in Western than in Eastern States.

In addition, the Western States base the acquisition of a right to use water primarily on the priority of the use. This means that in Western States, a land application system being instituted at the present time may be in a less favorable position to claim a right to use water as opposed to another nearby water use that has been in operation for several years. In

contrast, the rights of riparians in Eastern States are equal no matter when each use of water began; a use in operation for several years cannot foreclose a newly-proposed use by another riparian.

These distinctions between Western and Eastern States mean that a land application system in Western States (1) might have more difficulty in establishing an initial right to use water, because of other prior uses; and (2) might have a risk of liability for damages to a slightly broader group of water users. On the other hand, if a nearby landowner tried to enjoin an established land application system, his chances of success would be as unlikely in most Western States as in Eastern States. This is because, in a judicial action between competing landowners, the western courts recognize the same "equitable" defenses as do eastern courts and place the same emphasis on allowing "reasonable" uses of water to continue in operation.

SECTION 3

RIPARIAN STATES

LAW OF WATERCOURSES

Description

Once a "natural watercourse" has been ascertained, the owners of interests in land adjoining the watercourse will have riparian rights. The right is a property right, but rather than being a type of ownership, it gives the owner only certain rights to make *use* of the water:

> Water is a movable, wandering thing, and must of necessity continue common by the law of nature; so that I can only have a temporary, transient, usufructuary property therein: wherefore a body of water runs out of my pond into another man's, I have no right to reclaim it. (10)

In contrast to the appropriation doctrine, actual use of the water, or priority of use, is irrelevant to the existence of the riparian right. It inures in the ownership of an interest in riparian land, and a riparian who has not previously used the water has just as much right to it as one who has used the water for many years.

Theories of Riparian Rights--

There are two basic statements of the scope of riparian rights. The "natural flow" theory states that the owner of riparian land is entitled to the natural flow of the stream past his land (or, in the case of a lake, to its level in its natural condition) without diminution in quantity or deterioration in quality (11). Under this theory, also known as the "English" rule, the landowner's right was enforceable even if no actual damages could be proved (12). The same view has been adopted in those United States jurisdictions that follow the English rule (13). However, the right has never been quite as absolute as it sounds. Each of the riparians, for example, might use the water for necessary household and domestic purposes, such as drinking, bathing or cooking, without liability to downstream riparians even though such uses must necessarily consume some water and thereby diminish the flow of the river at least slightly (14). However, any use tending to divert more than a minimal amount of water, or affecting the stream's quality or velocity of flow in a material way, was unreasonable and enjoinable.

The natural flow theory discouraged any development of industry or agriculture that relied on using the waters of a stream. The surge of industrial development in the eastern United States in the latter half of the nineteenth

century caused many courts to conclude that the natural flow theory prevented effective utilization of their state's water resources. In most industrialized states, the English approach was replaced by the "reasonable use" theory. Under this view each riparian landowner had an interest in only so much of the stream as he could put to a reasonable and beneficial use, with due regard for the similar rights of other riparians to put the stream to reasonable uses. This new theory had several important aspects, of which the most important were that proof of actual damages to the plaintiff and proof of the unreasonableness of the defendant's use became essential to the maintenance of an action (15).

It should be emphasized that the development of the reasonable use theory was not a blank check for diversion and pollution of natural watercourses. Extreme cases of pollution could be and were, occasionally, enjoined. But as courts became more inclined to vindicate private water rights by an award of money damages rather than by the grant of an injunction that might close down an industry (16), the consequences of the reasonable use theory included both more effective utilization of water for agricultural and industrial purposes, and eventually more pollution as well. Although massive pollution by an industrial plant might still be enjoined, a "small" amount of pollution would often be condoned--or would entitle the plaintiff to a damages award only--if it was the necessary result of producing a desired good. But as industry multiplied on major waterways, a series of "small" polluters could eventually overload the carrying capacity of the river and produce the same deterioration as one or two massive polluters. In addition, the location of a series of industries on the same river tended to establish the area's "industrial" character and, thus, the reasonableness of each industry's choice of location; and it made it increasingly difficult for a plaintiff to prove whose discharge caused his harm.

The trend from the natural flow to the reasonable use theory has been an ongoing and gradual process. Even today there are states that, in name at least, observe the natural flow theory. Moreover, in many of the states which have adopted the reasonable use approach, "natural flow" language may reappear in the course of an opinion in a case won by the plaintiff.

Factors Establishing a Reasonable Use--

Since most of the litigation that occurs today will occur in a context of deciding what is a "reasonable use," it is worthwhile to examine what is meant by the term. Under the natural flow theory, the withdrawing of water from a stream could occur for a "natural" purpose, which was generally permitted, or for some other riparian or non-riparian purpose, which was generally prohibited. This classification of purposes for which water was withdrawn decided many cases. But under reasonable use analysis it is necessary in all cases to determine whether the particular use is reasonable or not. Basically, to be reasonable, the purpose must be lawful and beneficial to the drawer of the water, such as propelling machinery, operating a mill, or generating electricity. The use is not reasonable if the user is acting in violation of law, or out of spite or with malice, or in any case without demonstrable benefit to himself. Also the purpose must be suitable to the stream involved, and the social value of the proposed use is a proper factor in determining what is reasonable. Consumptive uses of even substantial size

are proper if they produce economic benefits recognized as desirable by the customs of the particular locality. Irrigation, for example, is a reasonable use in all jurisdictions (17). Even under the reasonable use concept, of course, a particular irrigational enterprise might be held to be improper if the method used to divert water to the irrigated land was wasteful in application, or pre-empted too much of the flow of a stream for what was seen as just a moderate irrigational benefit.

Another important factor in determining reasonableness of the use is the destination of the water. Although a diversion of water to non-riparian land is not necessarily unreasonable under the reasonable use rule, still the question of where the water is being used is a relevant issue since the right in question is a "riparian" right. A riparian can, in most states, use the water on all of his land even though some of the land is not "riparian," but a totally non-riparian use by a non-riparian landowner is usually still unreasonable even under the most liberal application of the reasonable use rule.

In addition to the purpose and destination of the use, other important factors in determining whether a particular use is reasonable are: (1) quantity of water to be used; (2) quality of the water when returned to the stream; and (3) alteration of the manner of flow.

A quantitative division may be easy when two potential users are located directly across the stream from each other, but when, as is usually the case, they are upper and lower proprietors, the court's decision must consider the total number of affected riparians, many of whom may not be directly represented in court, and the quantities of their several needs. In ascertaining the defendant's fair share of the water, the court may consider such factors as the parties respective stream frontages, the size of the stream, the nature of the proposed use, and the amount of land requiring irrigation possessed by each claimant. Also, an important factor is whether the diversion will return the used water to the stream in quantity equivalent to that diverted; thus an irrigational use, with a high degree of water loss through evaporation, may be less likely to be reasonable than an industrial use with little water loss (18).

In general, riparian uses that adversely affect the purity of flow are more sharply restricted than those affecting only the quantity of flow. Pollution cases are usually caused by mining, industrial use, and the disposal of urban sewage; as might be expected, such cases often involve conduct with a high degree of social utility but causing a significant decline in water quality. As a result it is difficult to state a general rule as to how much pollution is reasonable. Usually the use is reasonable where the degree of pollution is small, with significant factors including such things as the volume and velocity of the stream, the uses to which it had previously been put, the use and location of plaintiff's land, the magnitude of the harm caused to plaintiff, and the customs of the locality.

Alterations in the manner of flow generally involve: (1) detention of water, either permanently or temporarily, by means of a dam; (2) construction by one riparian designed to prevent water damage to his property; or (3) increasing the rapidity of the current, either through changing the structure

of the stream or through discharges into the stream. In determining the reasonableness of any such alteration, courts consider all the relevant circumstances, including (in case of a detention) the quantity of water detained, the length of the period of detention, the general usage of streams in the locality, and the timing of detention in relation to the needs of other users.

Remedies for Invasion of Riparian Rights--

Assuming a plaintiff pleaded a cause of action for invasion of his riparian rights because of trace contamination of the watercourse on which he owned riparian land, several issues that can be loosely grouped as questions of remedies assume importance. The type of remedy most likely to be sought would be judicial. Although every riparian state has an administrative program for controlling water pollution, none of the administrative programs preempts available judicial remedies. Once a plaintiff seeks a judicial remedy for harm allegedly caused to him, his choice is to seek injunctive relief and/or money damages. In either case the action for invasion of a private riparian right in water is usually characterized as an action in private nuisance, with the available remedies and their limitations following the traditional pattern of nuisance cases.

Injunctive relief--The remedy with the most extreme consequences for the defendant would be an injunction. A court granting injunctive relief could either order the defendant to abate the nuisance by modifying the defendant's manner of operation; or, if defendant's operation cannot be modified to cause less pollution, the court could terminate defendant's entire operation.

The usual basis for a court's willingness to consider injunctive relief is the inadequacy of the plaintiff's remedy at law for money damages. This inadequacy is fairly easily established in water law cases if the plaintiff can otherwise demonstrate a case on the merits--that is, actual harm to him caused by defendant--since the alleged wrong is usually of a recurrent nature, such that the plaintiff would need a multiplicity of suits at law, and since money damages are traditionally said to be inadequate where damages are to land (19).

Even if the plaintiff proves his harm and proves causation by defendant, however, injunctive relief will not automatically be granted. From the basic principle that "he who seeks equity must do equity," the courts have developed a number of defenses to a plaintiff's action for injunctive relief.

The first such defense is that of "laches". This rule provides that a plaintiff who delays in the enforcement of his rights, and by his delay causes additional harm to the defendant and which prompt action would have avoided, will be barred from seeking injunctive relief. For example, if a plaintiff landowner observed construction of a factory which he knew might interfere with his riparian rights, but did not sue until after the factory was completely built and operating, he would not be allowed to obtain an injunction (20). The doctrine is not applicable to actions for money damages, which will be governed by a statute of limitations, but it still prevents most enterprises once they commence operation from being shut down.

In the case of a major on-land application system, the creation of which was accompanied by a reasonable amount of publicity, it is likely that once the system is in operation, any action by downstream riparians for injunctive relief would be barred by this doctrine. The only possible ways of avoiding this doctrine would be if the plaintiffs could show either that they did not reasonably know about the system until after it was completed, or that, even if they knew of the system's pendency, they did not reasonably know that it was likely to affect their water rights until after it was in operation (21). However, if a plaintiff *could have* learned about the manner of operation of the application system, including the possibility of trace pollution, he will be barred by laches even if he did not in fact learn of its operation until after it was underway (22).

A second defense is one called "coming to the nuisance" (23). Like laches, this is another form of acquiescence in the defendant's conduct. Under this doctrine, a plaintiff who has purchased land in the vicinity of the defendant's land on which the conduct objected to was already occurring is often said to have "come to the nuisance" and is therefore barred from injunctive relief. The courts in the United States are in disagreement regarding the availability of this defense. The cases allowing the defense emphasize that, without it, a plaintiff can buy land cheaply next to a known nuisance, close down the nuisance and thereby achieve a windfall (24). The majority, however, reject this defense, usually on the ground that allowing it permits the early settlers in a neighborhood to completely control the future nature of the area, and thus blocks the fluidity of land use that is seen as a basic ingredient of the American economy (25).

The most important defense to a suit for an injunction is the process known as "balancing of the equities" (26). Under this doctrine, an injunction will be refused--despite the plaintiff's having established a cause of action--where granting the injunction would cause substantial hardship to the defendant without equivalent benefit to the plaintiff. This process is universally followed where the plaintiff's injuries are merely nominal (27). Even where the landowner proves substantial harm, however, a significant number of courts are still willing to balance conveniences (28). For example, in the classic Tennessee case of *Madison v. Ducktown Sulphur, Copper & Iron Co.* (29), three farmers proved that the company's air pollution caused a substantial amount of damage to their farmlands. The company, on the other hand, proved that there was no feasible way to reduce the pollution from its ore-reduction furnaces under the existing technology; that it had located at a prudent location, as far away from residential areas as the transportation needs of its employees would permit; that it employed a significant number of people and paid a large amount of property taxes; and that the local community would be severely depressed if it had to cease operations. The court, on the basis of these facts, declined to issue an injunction and relegated the farmers to an action for money damages only.

The issue of whether courts should "balance the equities" once the complaining landowner has proven a case has been a persistently recurring one in a time of heightened concern over air and water pollution. A few courts have rejected the concept, noting that the doctrine allows the polluter to compel the injured party to sell an interest in land to the polluter, and that in

cases betwe[illegible]all landowners and large industries it deprives the financially poore[illegible] litigant of his property in favor of the more powerful. Others, however, have emphasized the drastic consequences that could ensue if a landowner with perhaps several hundred dollars of damages could shut down a large industrial plant. Even New York, which was once a leader among states refusing to balance equities to deny injunctive relief, has recently noted in a air pollution context that it will not use nuisance cases to fashion an air pollution code, and will, in appropriate cases, deny injunctive relief despite plaintiffs' having proved their case (30).

In general, the majority of courts today will not grant injunctive relief that shuts down an industry or other major water user without just examining the harm that will ensue, not merely to the parties but also to the community at large, if the relief is granted. Among the factors that would be relevant, in the context of land application systems, are:

1. The prudent choice of location of the place of application;

2. The fact that on-land application cannot be conducted without some dispersal of trace contaminants;

3. The jobs created by the project;

4. The crops grown for public consumption by the project;

5. The revenue to be derived from crops sold, in the case of public application facilities;

6. The cost-effectiveness of the system as compared to alternate disposal methods for effluent;

7. The cost savings to the community for wastewater treatment;

8. The project's furtherance of the often declared national goal of cleaning up America's waterways; and

9. The project's furtherance of the goal of lessening farming dependence on chemical fertilizers.

All of these factors would be strongly arguable in support of the on-land application system; all would rebut a plaintiff's request for injunctive relief. In sum, assuming that the particular system is prudently operated such that the plaintiff's injury, if any, is not being caused by any negligence of the system's operator, then it seems likely that, in any court willing to balance the equities, an injunction closing the project would be denied to any complaining landowner.

Money damages--A landowner's other possible judicial remedy would be an action for money damages, which could be brought either separately or in the same action as the request for an injunction. The damages remedy is more complex in terms of defenses available, recoverable items of damages, burden of proof, and recoverable measure of damages. A number of the defenses

available in an action for injunctive relief are not available in an action for money damages. The defense of "laches" is unavailable, since the action for money damages is governed by an applicable statute of limitations. Most importantly, the doctrine of "balancing of the equities" is not available, as the plaintiff is not seeking equitable relief (an injunction) lying in the discretion of the court, but relief to which he is legally entitled (money damages) if he proves his case. Accordingly, the Wisconsin Supreme Court in *Jost v. Dairyland Power Corp.* (31) held the defendant's proof of the economic and social utility of its conduct, while relevant to an action for injunctive relief, was irrelevant to an action for money damages. Thus, a defendant found to be creating a nuisance causing harm to adjoining landowners may not be closed down but may be required to buy out those landowners.

Regarding what the plaintiff is required to prove in order to establish a cause of action, in a "natural flow" jurisdiction the plaintiff can recover nominal damages in the absence of proof of actual harm. Assuming, however, that the plaintiff will want more than the pride attendant upon a successful jury verdict for $1.00, in all riparian jurisdictions he will have to prove the actual damages he has suffered. The damages must be "real, material and substantial" (32), and must include proof of not only harm to the plaintiff but the fact that the defendant is the direct and proximate cause of the harm. The plaintiff will bear the burden of proving each element of the cause of action (33).

Once the threshold issue of material harm has been met, another question is what principle will be applied to determine the amount of damages recoverable by the plaintiff? The action may be one for permanent damages or one for temporary damages. Where the harm caused is found to be capable of correction, generally only temporary damages are allowed; the usual measure of recovery being the depreciated rental value of the property during the period of continuance of the nuisance (34). But where the harm caused is incapable of being correct except for closing the offending business, and where the court has determined as matter of discretion that it will not allow an injunction to close the business, the landowner will be allowed permanent damages. The measure of permanent damages to the riparian owner is the difference in the value of the land before and after the injury (35). In *Standard Hocking Coal Co. v. Koontz* (36), where the defendant pumped sulphuric acid from its coal mine into a stream running through the plaintiff's land, the court stated that:

> We further think that it is a sound principle of law that in an action for damages to real property testimony is admissible to show the exact character of the injury suffered, whether of a permanent or irreparable nature, or of the sort susceptible of repair, so that the property may be restored to its original condition. If the testimony shows the former to be the nature of the injury, the measure of damages is the difference in value of the property before and after the injury. If an injury susceptible of repair has been done, the measure of damages is the reasonable cost of restoration plus the reasonable compensation for any loss of the use of the property between the time of injury and restoration, unless such cost of restoration exceeds

the difference in the value of the property before and after the injury, in which case the difference in value becomes the law. (37)

Another issue with regard to money damages is the types of harm a plaintiff can recover damages for. It is generally stated that one may recover for any injury flowing in the usual course of things from the wrongful conduct. "Personal inconvenience" is sometimes rejected as an independent basis for the recovery of damages, on the theory that it is an aspect of the recovery for harm caused the landowner in the use and enjoyment of his land, has been incorporated into the recovery for declining market value, and should not be used again as a base for damages. However, in some instances recovery may be allowed for the defendant's noise, decrease in the "comfort and enjoyment" of the plaintiff's premises, and for "annoyance and inconvenience" caused by the pollution.

If "malice" can be shown, punitive damages may be collectible. Although it would seem that "malice," in the lay sense, could not be shown in operating any land application system, a recent Oregon case, *McElwain v. Georgia-Pacific Corp.* (38), is of some interest. In this case the plaintiff sued to recover damages to his realty caused by smoke and fumes emitted by the defendant's paper mill. The trial court withdrew the issue of punitive damages raised by the plaintiff. On appeal by the plaintiff from a jury verdict of only $2,000 compensatory damages, the supreme court reversed and remanded the case for a new trial, holding that punitive damages could be recovered "...wherever there was evidence of a wrongful act done intentionally, with knowledge that it would cause harm to a particular person or persons" (39). As the dissent pointed out, the court's broad definition of malice could cover virtually every case of industrial or municipal pollution.

Although such decisions should be noted as perhaps reflecting a tendency toward imposing the costs of pollution more directly on the polluter and users of the polluter's product, it does not follow that the operator of an on-land disposal system, even if it lost a nuisance suit for money damages, would be obligated to pay punitive damages. The pollution in the Oregon case, while perhaps unavoidable, was a particularly obnoxious type (sulfide emissions) and carried on in substantial amounts. In addition, evidence indicated that the company had moved slowly to utilize readily-available pollution control equipment. Even in a state disposed to adopt the broad Oregon definition of malice, of which there are few, the typical on-land application system will involve primarily the *removal* of pollutants from streams, not their introduction, with only minor or trace elements returning to streams. It is highly improbable that an on-land application system, operated with due care, including all reasonably-affordable pollution control devices, would be liable for punitive damages.

Implications for Land Application Systems

The law of natural watercourses in most riparian states does not distinguish between the different types of land application systems, such as the several types of irrigation methods, the overland-flow method, or the rapid infiltration method. The law is concerned instead with the *effect* of any proposed use on the quality and quantity of the water flowing in a natural

watercourse, and on the uses that may be made of that water by other riparians.

Any of the major types of land application systems could have either or both of two possible effects on natural watercourses:

1. The system, by collecting wastes which may previously have been discharged into natural watercourses, will alter the pattern of flow of the body of water into which the wastes would have been discharged in the absence of the land application system. Basically, the system's institution will improve the quality of the water, but decrease the flow beneath the previous point of discharge.

2. After the wastes are collected, treated, and applied for irrigation purposes under any of the methods of application, trace contaminants may remain which may then drain into a natural watercourse. Such drainage may occur into either the original watercourse from which the wastes were diverted or into a different body of water. Although the amount of remaining contaminant may vary with the type of application method, the care with which the effluent is applied, the characteristics of the soil and other factors, the legal principles and their implications remain the same in any case. The result in a given case, however, might vary with the severity of the pollution caused by the trace contaminants.

With regard to the first effect of an application system on a watercourse, interference with flow, the law of natural watercourses in riparian states has generally favorable implications. Any of the possible methods of application would be defined as "irrigation," and it is uniformly held that irrigation is a reasonable--and therefore permissible--use of the waters of a natural watercourse. Since this conclusion has been stated in situations where the irrigator is diverting the pure waters of a stream, the same conclusion is even more likely where the irrigator is diverting primarily wastes and, as a result, improving the stream's quality. In addition, a few riparian states distinguish between "consumptive" and "nonconsumptive" uses of water. In these states a land application system, unlike more typical methods of irrigation, would probably be considered "nonconsumptive," because it would divert primarily wastes, rather than the stream's natural flow of water. Uses bearing such a label are more likely to be upheld as reasonable.

This general conclusion of reasonableness does not mean that every conceivable land application system would be shielded from legal consequences in every conceivable riparian state forum. For example, a particular project might divert a tremendous amount of wastes and, necessarily, some water along with the wastes. If this occurred on a stream where a downstream landowner could prove that he was harmed by the loss of wastes and water flow, that owner would have a claim against the operators of the system. Since most landowners cannot be harmed by the removal of effluent from their stream, this is unlikely to happen; only a downstream user unconcerned about *quality* of flow but only concerned about *quantity*--such as a hydroelectric plant--would be a possible complainant. Also, since riparian rights attach

only to the water in the watercourse, and not to any wastes previously discharged into the water; the fact that the discharges now being diverted had occurred for many years would not be legally significant.

Such a lawsuit is unlikely to occur; however, if it did occur the operators of the application system could be held liable for the damages proven by the downstream landowner, and might even, in an extreme case, be enjoined from further operation of the system. Because of the many "equitable" defenses previously discussed, the possiblity of an injunction being issued against a use legally characterized as "reasonable" is quite small. To minimize this possibility still further, there are several steps that can be taken in the institution and operation of a land application system:

1. In establishing sites for land application systems, consideration should be given to the nature of the uses of the water occurring downstream from the point of diversion. The existence of a large water consumptive user whose use does not depend on the quality of the flow, such as a hydroelectric power plant, or flow within reasonable water quality limits, such as a pulp and paper mill, could be cause for concern. Although there is no precise boundary that can be stated, the further downstream the conflicting use is located, the less relevant it is, since it will be more and more difficult for the user to prove the land application system caused any harm to his operation.

2. In establishing sites for land application systems, consideration should be given to the volume of flow of the stream or river from which diversion will be made. The same diversion may tremendously affect the quantity of flow on a small stream but have only a marginal impact on the quantity of flow on a large stream. On the the other hand, conflicting uses of water may be more likely to occur on the large stream, in which case these factors may counterbalance each other.

3. If diversion of wastes will occur directly from a natural watercourse (as opposed to diversion before the wastes enter a natural watercourse) care should be taken to insure that as much of the water as possible is either left in the watercourse or if removed, returned at or near the point of original diversion.

The second way in which the law of natural watercourses in riparian states intersects with land application systems is when, after application, trace contaminants remain on the land and are eventually washed into a natural watercourse. Such a result will not always occur; the nature and quantity of trace contaminants remaining after application will be a function of the method of application used and the skill with which it is applied.

It is clear that there can be liability in all riparian states for the pollution of the waters of a natural watercourse. This can occur even with a use that is "reasonable;" it being recognized that even reasonable uses may harm other interests and should compensate those harmed as part of the cost of operation. Theoretically an injured downstream landowner could

receive relief in the form of either money damages or an injunction. However, the likelihood of either type of relief being awarded is extremely remote.

If an application system was being carelessly operated, causing pollution that could be avoided by careful operation, then an injunction against the careless operation might ensue. But if the system is being carefully operated, and if the only pollutants returning to natural watercourses are those unavoidably remaining after application, then it is most unlikely that the entire application system would be enjoined from further operation. Since most riparian states apply the "balancing of the equities" doctrine, their courts will consider, in any action for an injunction, all the facts relating to the reasonableness and usefulness of the land application system.

Many damages sought by a claimant instead of injunctive relief would be in theory easier to obtain. The possibility, however, is limited by several factors. First, the right to sue for harm to a watercourse is limited in almost all riparian jurisdictions to persons owning an interest in land adjoining the watercourse. Citizen suits by non-riparians are authorized by certain Federal laws, and non-riparians, as well as riparians, can sue in some states to protect common law rights in navigable waters, such as the right of the general public to fish in or boat on such waters (40). However, the possible trace pollution that might occur after application is extremely unlikely to rise to the level of substantial interference with the public's common law rights. The more likely possibility is the assertion of damage to one's riparian rights; and within this legal category one who does not own an interest in affected land cannot sue.

Second, the landowner who brings suit must prove actual harm to the water that affects the market value of his land. Even if he proves that some pollution is occurring, that is not enough to recover damages; he must show that the pollution is causing harm to his property that affects its market value. In the case of mere trace pollutants, such a showing will usually be difficult if not impossible to make. And, finally, any possible recovery of damages will be limited to the proven decline in the land's market value. In a rural area this will not often be a large amount, and as a result grandiose or vexatious claims will be discouraged.

There is no way the system's operators can totally eliminate the possibility of liability for trace pollution of a natural watercourse. Even if all necessary operating permits in the particular state are secured, these permits do not shield the operator from possible liability. Therefore, in establishing sites for land application systems, consideration should be given to whether the desired method of application and the soil characteristics will cause a greater residue of pollutants than would occur with a different method of wastewater management. Consideration should also be given to whether there is a watercourse located close enough to the application site such that pollutants might drain into the watercourse, such as during heavy rainfalls. If there is a watercourse located close to the application site and likely to occasionally receive trace pollutants, then consideration should be given to the nature of the uses occurring downstream and whether any of them are likely to be harmed by the types of pollutants

that may be discharged, and to the quality and flow of the watercourse, and the likely impact of the pollutants upon that quality and flow. A few riparian jurisdictions require monitoring of specific parameters, such as pH, biochemical oxygen demand (BOD), suspended solids, and fecal coliform bacteria (3, 5-6). Some of these jurisdictions will be specified in Volume II of this report.

In conclusion, in most riparian states it will be unlikely that any land application system could be subjected to damage awards of a size likely to impair the successful continued operation of the system. Although an instance of negligence--say, in design of a system or in treatment or dispersion of wastes--could lead to a substantial damage claim. However, the risks are small in ordinary operations. The potential riparian plaintiff's obligation to prove demonstrable harm and causation of his harm by the system will be exceedingly difficult to sustain in a case involving only trace contaminants remaining after careful operation of the system. Even if an occasional case could be proven, the further limitations on recovery, in particular the market value standard, will prevent the sort of grandiose claims that could impose severe costs on a waste disposal system. Vexatious litigation by nearby landowners fearsome of the waste disposal system is always a possibility, but in the absence of provable negligence in any phase of the systems operation, the chance of success in such suits appears small.

LAW OF SURFACE WATERS

Description

It is clear in all riparian jurisdictions that a landowner can make any use he desires of the surface water found within the boundaries of his land. Riparian rights do not attach to water until it reaches a natural watercourse, and there are no other recognized concepts of "rights" in water in the riparian theory states which restrict consumption of water on the land where it is found. Consequently, a lower landowner cannot prevent an upper landowner from making whatever use he pleases of the surface water, even if that use prevents any surface waters from reaching the lower land.

The more difficult legal issues involving surface waters occur when the surface water crosses from the upper to the lower landowner's land. The legal issues can involve either: (1) the asserted privilege of the lower landowner to refuse to receive the surface waters coming to the edge of his property, usually by building a wall or dam; or (2) the asserted privilege of the upper owner to cause the surface waters to flow (a) onto the land of one who would not naturally receive them, or (b) onto the land of one who would naturally receive them, but with an accelerated flow.

Civil Law Rule--

Where the case involves obstruction or deflection of flow of surface waters, there is a three-way division of authority in riparian jurisdictions as to the appropriate rule. The earliest rule applied in the United States is what is known today as the "civil law" rule. Basically, the civil law view was that the natural state of affairs should be disrupted as little as

possible. All land was seen as subject to a natural obligation, called a "servitude," to receive the natural flow of surface water. Consequently, a landowner who obstructed such a flow onto his lower-lying lands would be liable for damages caused thereby to the upper landowner (41). Similarly, as the servitude applied only to natural drainage, states following the civil law view held that the upper landowner could not send the surface waters onto land of another where they would not naturally flow (42), and that he also could not alter the manner of flow onto the lower landowner against his objection (43). Although the latter two points have been modified in many jurisdictions that no longer follow the strict civil law view, the civil law doctrine retains much modern support and acceptance, despite the obvious handicap it imposes on development. Cases applying some version of the civil law rule can be found today in Georgia, Iowa, Kentucky, Maryland, Michigan, Mississippi, Nebraska, North Carolina, Ohio, and Oregon (44). In the absence of a valid claim of prescription, the landowner in a pure civil law jurisdiction would not have a right to change the directional flow of surface waters as established by natural conditions, nor to concentrate or accelerate the flow by means of drains and ditches.

There are, however, a number of qualifications of these rules in most civil law jurisdictions. For one thing, a landowner may erect improvements on his land, or use the land for agricultural purposes, and in the absence of negligence he will not be held liable for damages because of changes in surface water drainage resulting from such activities (45). Another exception found fairly frequently in court decisions holds that surface water may be drained by a ditch that is constructed in accordance with the natural flow of the surface waters (46). Similarly, it is frequently held that a riparian owner can construct ditches to drain surface waters into the watercourse if that is the natural drainage pattern and if the construction and consequent drainage does not result in a flow exceeding the capacity of the watercourse (47). The harshest aspects of the civil law rule have been further mitigated by decisions allowing alterations causing only "minimal" harm (48), and by an occasional judicial inclination to avoid the rule by classifying the water in controversy as "flood waters," to which the civil law rule is inapplicable (49). Also modifying the rigor of the civil law rule is the tendency in some states to retain the civil law rule as the "rural" rule and adopt the common enemy rule as the "urban" rule (50).

Common Enemy Rule--

A second rule applied in many states to cases involving obstruction of the flow of surface waters is the "common enemy" rule, which originated in Massachusetts. Under this view each landowner is entitled to regard surface water as his enemy, and might use any means available to prevent surface water from reaching his land, and to reduce his harm to a minimum without regard for the possible effects on his neighbor (51). Thus, the lower landowner may build dikes so that the surface water will remain on the higher landowner's land (52), or may channel the water across his land for discharge onto the lands of others (53). The upper landowner, in turn, may build better ditches so that the water leaves his land as soon as possible.

This doctrine, like the civil law doctrine, has not been applied quite so literally in any state. As has been noted, many states have adopted the

common enemy rule in urban areas, because courts feel that development of urban land is to be expected by landowners, while preserving the civil law rule in rural areas (54). Also, some states following the common enemy doctrine apply it only to surface waters such as rain and melting snow. In these states the lower lands remain under a natural servitude to receive other surface waters of higher lands that flow along natural depressions on the surface of the ground (55).

Other limitations occasionally applied in common enemy jurisdictions are: (1) cases allowing for recovery of damages where a landowner causes surface waters to be discharged with exceptional volume and force onto the lower land (56); (2) cases imposing a restriction that the constructing landowner must use due care and not unnecessarily or negligently injure another landowner's property (57); and (3) in close factual situations, cases in which courts hold a particular natural depression constitutes a "natural watercourse" rather than "surface water" (58).

Reasonable Use Rule--

The third major rule, applied by an increasing number of states, is the "reasonable use" rule, which has been adapted from the law of natural watercourses. The same issue of what uses are and are not reasonable is presented as in natural watercourse cases, but once the particular use is said to be reasonable, it is then held in the surface water cases that the landowner cannot be held liable for damages caused by drainage of surface water in the absence of malice or negligence (59). This rule most clearly facilitates commercial development, and may gradually be developing into the most favored of the possible surface water rules.

Exemplifying this trend is the recent Wisconsin decision, *State v. Deetz* (60). Land developers had purchased a large area of land on a bluff overlooking Lake Wisconsin, and were platting and developing a residential area on the bluff. The development disturbed the topsoil on the bluff, which had previously been used as pasture land, and caused a significant increase in erosion and runoff. As a result of the project a sand delta of over 6,000 square feet formed in the lake, impeding fishing, boating, and swimming in the area. The state sued to abate a public nuisance and to prevent an unlawful obstruction of navigable waters. The trial judge dismissed the complaint, concluding that the statutes prohibiting unlawful obstruction of navigable waters were irrelevant in the case because the silt that filled in part of the lake was not "deposited" by the developers, but rather resulted from the flow of surface water from the development. This, according to the trial judge, was not a compensable wrong because the damage had been done as part of the property owner's legally recognized right to fight "common enemy," surface waters (61).

On appeal, the Wisconsin Supreme Court reversed the trial judge's decision. Conceding that the common enemy rule was of long standing in Wisconsin, the court noted that in recent years at least 13 states had adopted some form of a reasonable use rule, either in preference to or as an adjunct of either the civil law rule or the common enemy rule (62). While the court recognized that the common enemy rule "...apparently served the temporary purposes of society well in the days of burgeoning national

expansion of mid-nineteenth and early twentieth centuries," it concluded that "[T]he concept that a (sic) owner of real property can, in all cases, do as he pleases with his property is no longer in harmony with the realities of our society" (63). The court therefore adopted the reasonable use rule.

Implications for Land Application Systems

The law of surface waters in each riparian state makes no distinction between the several different types of land application systems. In most states, the law is primarily concerned with the right of one landowner to discharge surface waters across the land of another. References to the type of problems presented by land application systems are sparse.

Any of the several types of land application systems will have either or both of two main effects on the natural flow of surface waters in the area of the application site.

1. After the treated effluent is applied to the site for irrigation purposes, trace contaminants may remain which may then be carried off the site with surface waters, such as precipitation, and which may cause the pollution of those surface waters when they cross onto other lands.

2. If, on the other hand, precautions are taken to retain trace pollutants after application within the perimeter of the application site, surface waters, such as precipitation, will also be retained at the application site, and will not flow across adjoining lands as they had prior to institution of the land application system.

The law has implications for land application systems in both of these situations. Although the law is not unfavorable in either situation, the implications are more favorable in riparian states in the second situation, when both pollutants and diffused surface waters are retained at the application site, than in the first situation, when both are dispersed to adjoining lands.

In the first instance--trace pollution of surface waters crossing the lands of another person--many riparian states have no law directly on point. The surface water cases are primarily concerned with the issue of an upper landowner creating a discharge that did not previously exist, usually by building on or paving his property, and not with the issue of adding pollutants to an already existing surface water flow.

Those jurisdictions that have cases in point indicate that liability for pollution of surface waters will be governed by the same principles controlling liability for pollution of natural watercourses. In other jurisdictions the issue is not quite so clear. If the most restrictive of the competing rules, the civil law view of preserving the natural state of affairs, were applied literally in the pollution context, it would mean that every instance of trace pollution would be enjoinable, as an interference with the natural flow. In no riparian state, however, is the rule so applied. Even those states which adhere to a relatively pure civil law rule for issues involving

dispersal of surface waters indicate that pollution of those waters is governed by the analysis applicable to pollution of natural watercourses. This will usually be a rule of "reasonable use," even in states classified as "civil law" or "common enemy" jurisdictions for other purposes. That is, pollution for no valid purpose might be unlawful, but pollution in connection with an otherwise reasonable use might be lawful. Since, as we have established with regard to natural watercourses, land application systems are reasonable uses, it is very unlikely that a land application system would be prevented from operating because of trace pollution of surface waters. The system operators might have to pay for damages caused to adjoining land owners, but the possibility of such liability is even less likely in the "surface water" category than it is in the "natural watercourse" category. This is because, in addition to the requirements of proof previously discussed: (1) the potential claimants for harm to surface water are almost always limited to the immediately adjoining landowners, rather than including all downstream owners as in the natural watercourse category; (2) the right to use surface water is not a "property" right as is the right to use the water of a natural watercourse; and (3) since less gainful use is generally made of surface water, it is much more difficult for a claimant to prove the loss of a specific use and consequently, a decline in the market value of his land.

Turning to the second possibility--that is, if the system collects both surface waters and trace pollutants on its property--there is no possibility of liability in riparian states for interference with the flow of surface waters. It is clear that, as the lower landowner has no "property" right to the surface waters, he cannot insist on their continued flow. The upper landowner--in this case the land application system--can with impunity collect all surface water on its property.

In conclusion, when creating land application systems, consideration should be given to prevailing surface water patterns, including topographical studies, precise locations where surface waters are likely to flow, locations of springs, water supply wells and buildings on adjoining lands, and specifications of any adjoining land uses that might be harmed by either the interruption of surface water flow or the addition of trace pollutants.

It must also be mentioned that several states have regulations designed to protect surface waters from possible pollution, which regulations will control various aspects of land application (3, 5-6). Some of these regulations will be specified in Volume II of this report. It should be noted, however, that the subjects most frequently covered by these regulations, as they pertain to surface waters, include restrictions on the allowable degree of spray field grade, requirements for specific buffer zones around application sites, requirements for dikes or ditches around spray fields to keep discharges within the system's perimeter, and specifications relating to the types of soils on which wastewater application can be undertaken and the vegetative cover that can be used.

LAW OF GROUNDWATER

Description

Groundwater--or percolating water--is water beneath the surface of the earth that does not flow in a well-defined channel and is not confined to a well-defined bed. Underground water that is in a channel or bed will be treated as a watercourse or lake, and will be subject to the same rules that are applicable to surface streams (64). It is often difficult to determine whether underground water is confined to a particular bed or channel; consequently, almost all riparian states presume that underground water is percolating water until the contrary is proved (65). Also, the general category of groundwater is itself subdivided into several different types of waters, each with different physical characteristics that occasionally become important in a particular case. These subcategories include artesian waters, underground lakes or pools, aquifers having either a high or low rate of recharge, and waters which ooze or filter through the soil and whose course is otherwise unknown.

Absolute Ownership Rule--

The common law rule regarding percolating water was one of absolute ownership. The rule stemmed from the famous English case of *Acton v. Blundell* (66), in which one landowner, by operating coal pits upon his land, dried up his neighbor's well. The court held for the coal miner, stating that the appropriate legal theory:

> ...gives to the owner of the soil all that lies beneath his surface; that the land immediately below is his property, whether it is solid rock, or porous ground, or venous earth, or part soil, part water; that the person who owns the surface may dig therein, and apply all that is there found to his own purposes at his free will and pleasure; and that if in the exercise of such right, he intercepts or draws off the water collected from underground springs in his neighbor's well, the inconvenience to his neighbor falls within the description of *damnum absque injuria*, which cannot become the ground of any action. (67)

Groundwater was considered to be simply part of the land, with the landowner having a proprietary interest in them. He was not restricted in the withdrawal of percolating water located under his land even if the withdrawal caused the drainage of waters from adjacent lands, with consequent injury to other landowners. As a logical consequence of this theory, any surface owner of land above the percolating water could take unlimited quantities of the water for such use as he desired, without regard for the perhaps contradictory desires of other surface owners. Also, this right, being a property right, could not be destroyed or substantially modified by legislation unless the landowner was awarded just compensation for it.

At one time, more than half of the states followed this doctrine of almost unrestricted privilege. While it is declining, it is still found in some states east of the Mississippi River where the recharge rates of subsurface aquifers are high and where wasteful use of water has been, until

recently, of little concern. Most of the states that have followed this doctrine have at one time or another qualified the rule by holding that it was inapplicable where the water was taken maliciously, or where the water was wasted or otherwise not used for a beneficial purpose (68). A few states also modified the rule by holding that there could be liability for negligently polluting the source of another landowner's supply of water (69).

Reasonable Use Rule--

While the common law rule was applied in most of the early decisions and may still be the law in about ten jurisdictions (70), and increasing number of Eastern States are applying a rule of reasonable use to percolating waters and are holding that the right of the surface landowner does not include the right to make an unreasonable use of percolating water to the detriment of other landowners (71). As in other areas of water law, there is no uniformity regarding what does or does not constitute a reasonable use. Some decisions hold that the landowner may use all of the percolating water if such use is reasonably necessary for the beneficial enjoyment of his land, even though this may deprive other landowners of sufficient water for the beneficial use of their land (72). Other cases reject this notion of an absolute right, and hold that the right has to be shared on a correlative basis.

A further distinction must be drawn in reasonable use jurisdictions between the *use* of percolating water and the *pollution* of such water. A use which merely interferes with the flow, if it results from a reasonable use of the land, such as mining or irrigation, and if it is conducted without negligence, is not an actionable wrong even if the interference with flow causes damage to adjoining landowners. This is true in common law jurisdictions following the absolute ownership rule (73), in states following the rule of reasonable use (74), and even in Western States following the prior appropriation doctrine (75).

But where the use causes pollution of percolating waters, there is a split of authority. The prevailing view is that the landowner causing pollution can be held liable only on proof of fault on his part either because he made an unreasonable use of his land, or because he made a reasonable use but acted in a negligent manner. A few cases, however, apply what amounts to liability without fault, holding that a landowner causing pollution of percolating waters may be liable for damages resulting from the pollution even though the use was reasonable and conducted without negligence. In *Berger v. Minneapolis Gaslight Co.* (76) the company stored large quantities of crude petroleum on its land, which escaped, seeped into the groundwater supply and polluted the adjoining landowner's well. The court held the company liable for the damages caused by the nuisance without proof of any negligence on it's part, reasoning that one who stores a hazardous substance on his land is liable if the harm was the "natural and probable consequence" of his acts. The court further held that the neighbor's recovery was not limited to a decline in rental value of the property, but could also include damages for any actual inconvenience and physical discomfort which materially impaired the enjoyment and occupancy of his home.

In contrast is the leading Rhode Island decision, *Rose v. Socony-Vacuum*

Corp. (77). A farmer sued on a nuisance theory because the nearby oil refinery discharged quantities of petroleum and waste substances into settling basins on its land, from which they percolated into the groundwater, polluting the farmer's well and stream and killing many of his hogs and chickens. The plaintiff based his cause of action on a theory adopted in several English cases that a person bringing a deleterious substance on his land keeps it at his peril, and is liable for all damage which is the natural consequence of its escape. The court rejected this theory, thinking it too broad, since anything brought onto land might escape and injure someone. But the court also noted that the cases establishing a landowner's "absolute" right to appropriate underground waters were not applicable either, since the question was not appropriation of water by the oil refinery, but pollution caused by the use to which it put its land. After extensive analysis of cases in several states, the court found that the jurisdictions holding that there was liability in the absence of negligence were states in which the predominating economic interest was agricultural; and it concluded that where the refinery was located in the heart of an industrial region, producing a "necessity of life," as a matter of policy there would be no liability in the absence of negligence.

Implication for Land Application Systems

The law of groundwater of most riparian states does not distinguish between the different types of land application systems. Instead, the law is primarily concerned with landowners' competing rights to use of such waters, and secondarily with the consequences of pollution or corruption of such waters.

Any of the major types of land application systems could have the following possible effects on groundwater supplies:

1. After application of treated effluent at the application site, trace contaminants may remain which may then seep into underlying groundwater supplies and pollute those supplies.

2. After application of treated effluent at the application site, remaining liquids, whether burdened with trace contaminants or not, may seep into underlying groundwater supplies and may raise the water table of the particular groundwater supply. This added water could be beneficial to users of the groundwater supply, but in some circumstances it could interfere with surface drainage of other lands.

With regard to the possibility of trace contaminants reaching groundwater supplies, the law of most riparian jurisdictions has reasonably favorable implications for establishment of land application systems. Although the amount and strength of contaminants reaching a groundwater supply in a given situation will vary with the application method used, the soil characteristics, the depth of the groundwater supply, and the care with which the system operators have prevented the drainage of contaminants into natural watercourses or surface waters, the basic principles of state water law and their implications, will remain the same.

In those states which apply the reasonable use rule to groundwater, legal analysis will be similar to the principles applicable to a claim of pollution of a natural watercourse. As in the case of an action to protect riparian rights, only affected landowners could sue, not members of the general public. The fact that citizen suits by persons other than landowners are possible under Federal law does not apply to state water law. Those landowners who chose to sue would have to show that the system polluted a groundwater supply, that the polluted waters they drew harmed their land, and the specific decline in market value of the land. Although the same remedies are available as in the natural watercourse area, again an injunction is unlikely to be granted against a reasonable use, and money damages will be difficult to prove and will, in any event, be limited to a decline in market value.

Liability is even less likely in those states which apply some version of the absolute ownership rule, as there will not be a cause of action for pollution in the absence of malice or negligence. In a few states there may be no liability even if negligence is proven. At the other extreme there are also a few states--in particular Minnesota and North Carolina--in which liability for pollution is imposed even in the absence of any negligence or other fault by the polluter. Thus, there are several positions regarding pollution of groundwater that might be taken by a riparian state, and as a result it is difficult to generalize about the "typical" riparian state's view on this issue. Listed in the order of descending possibility of liability, the various legal positions are as follows:

1. Strict liability for harm caused by pollution, even if there is no negligence;

2. Reasonable use rule applicable to questions of pollution as well as to questions of use of groundwater;

3. Absolute ownership rule of no liability, qualified to allow liability if either malice or negligence is proven;

4. Absolute ownership rule of no liability, qualified to allow liability only if malice is proven; and

5. Absolute ownership rule of no liability.

The majority of riparian states will be within categories (2) and (3), above, although there is at least one riparian state in each category, with Minnesota and North Carolina at the extreme of liability even without fault, and Vermont at the opposite extreme of no liability whatever.

If the legal question presented is not one of pollution, but of groundwater recharge from an application site raising the water level of the groundwater, the complaining landowner will have an even more difficult time in attempting to sue the system's operators. If there is no probable negligence in the operation of the system, and no intentional harm being done, there are no cases allowing any recovery by such a landowner, even in those states applying the "strict liability" rule to cases involving pollution.

Thus, in most riparian states the system operators could be found liable if the application system polluted groundwater because of negligence, such as an instance of careless application of faulty equipment, and could not be found liable for merely raising the water level in the absence of pollution. In any case, in establishing land application systems, consideration should be given to the nature and exact location of any groundwater supplies in the area, including the depth of the water table, the usual direction of groundwater flow, and the uses customarily made of such water in the surrounding area.

It should be noted that several states have specific regulations designed to protect groundwater supplies and that control various aspects of land application. Some of these regulations will be specified in Volume II of this report. The topics most frequently covered by state regulations relating to groundwater include limiting irrigation fields to sites with a specified maximum elevation of groundwater; controlling specific aspects of operation such as rate of application, grade of spray fields, and alternate distribution of effluent; and requiring groundwater monitoring in the area of the system for parameters such as organic nitrogen, ammonia nitrogen, nitrite and nitrate nitrogen, chlorides, sulfates, dissolved solids, alkalinity, hardness, and pH.

SECTION 4

APPROPRIATION STATES

APPROPRIATION DOCTRINE

Description

It is much more difficult to undertake a general discussion of the appropriation theory of water law and its impact on land application systems, than it is to undertake a similar discussion of the riparian theory. This additional difficulty is caused by the different origins of the two systems. The riparian system, as we have seen, was of common law origin. Although almost all riparian states have created water pollution codes in recent years, these codes coexist with, rather than supplant, the states' pre-existing system of water law. Consequently, a general discussion of the law in the 31 riparian theory states is possible, with occasional warnings that a few pertinent issues must be discussed on a state by state basis in the context of each state's statutes or administrative codes.

The appropriation theory states, however, have no such common basis for their water law. About all they share in common is a rejection of the riparian theory as being unsuitable to their usually arid condition. Most of the water law development in these 17 contiguous Western States and Alaska has been by statutes and supplementary administrative codes. Even though the types of statutes can be roughly grouped for some purposes, in many instances there is so much variation on a particular point that it is impossible to theorize about what an appropriation theory state, in general, would do in a particular case.

The doctrine of appropriation has been stated as follows:

> Under this doctrine he who is first in time is first in right, so long as he continues to apply the water to a beneficial use, subsequent appropriators may not deprive him of the rights his appropriation gives him, by diminishing the quantity or deteriorating the quality of the water. (78)

Thus the right to use water inured to the person who used it first. Whereas a riparian landowner in a riparian theory state had a right to use the water as part of his ownership of the land, a similar landowner in an appropriation theory state did not necessarily have such a right. His right to use water depended not on his title to land, but on the other uses already being made of the water at the time he decided to use the water.

Conversely, a person who was not a riparian owner could acquire no right to the water in a riparian theory state; but he could acquire a right through actual use of the water in an appropriation theory state. What was important in the Western States was *use*, not title to land.

Although the fundamental principle of "first in time, first in right" remains a salient part of the appropriation theory, it is no longer the sole criterion used by the Western States in establishing and recognizing the valid acquisition of an appropriative right in water. Constitutional and statutory provisions of the appropriation theory states have modified, to varying degrees, this fundamental principle of priority by establishing permit requirements and preferences in the use of appropriated water.

In contrast to the theory of riparian rights, which does not place a specific quantity limit on the amount of water a riparian may use, the doctrine of appropriation refers to a specific quantity of water predetermined by applicable statutorially defined administrative procedures, which in all cases are concerned with the actual use made of the water by the prospective appropriator. Use of water under the two theories may be explained as follows:

> One of the distinctions between the two doctrines is that appropriation contemplates a tenancy in severalty and riparian a tenancy in common. Thus, the appropriative right excludes the idea of equality among appropriators, and contemplates the use of a definite, certain, and fixed quantity of water. On the other hand, the riparian right is correlated with a similar right of every other owner of land riparian to the same stream and in the nature of things contemplates the right to use a variable quantity of water. (79)

In respect to the concept of "priority" in appropriation, a majority of the Western States fix seniority by requiring the appropriator to apply "...to a designated state administrative officer for a permit to appropriate; and if a permit is granted, it is confirmed by a certificate of right issued when he completes his diversion with the diligence required by the terms of the permit" (80). Only two states--Colorado and Montana--do not use a general permit system for the acquiring of an appropriative right in water:

> [In these] jurisdictions the right to appropriate is absolute, rather than dependent upon permit, and the date of right is determined by the first substantial act of the appropriator, performed in good faith, which leads to the diligent construction of necessary works for the application of appropriated water to his beneficial uses. (80)

Inherent in the concept of an appropriative right is the requirement that the use to which the appropriator puts the water must be beneficial.

> The statutes of most of the [Western] states specifically condition the right to appropriate water upon its being used for

> beneficial purposes without explicitly describing such purposes. The uses which have been deemed beneficial by the courts, include uses for irrigation, manufacturing, industrial purposes, municipal needs, domestic consumption, and stock watering. (81)

The requisite beneficial use, important to the initial acquisition of an appropriative right, is also one of the controlling factors in establishing a preference between uses. The concept of "preferred uses" is a qualification on the priority principle of appropriation. The value of a use is essential to the idea of preference, "...and a preferential right may have one of a number of different effects. It may give persons who use waters for some purposes a right to the water that is superior to prior rights for other purposes or it may give certain water users a better right than others using the water for the same purposes" (82). Basically, priority refers to the chronological order of acquisition of the water right, while preference relates to the character or relative value of the particular uses. The concept of preference has a multiplicity of ramifications concerning the appropriative right and will be discussed in more detail later.

The appropriative right in water is, strictly speaking, an usufructuary right to take the water from the stream into physical possession for the purpose of putting it to beneficial use (9). Thus, private rights to ownership do not attach to the water so long as it remains in the stream in its natural state.

> The true reason for the rule that there can be no property in the corpus of the water running in a stream is not that it is dedicated to the public, but because of the fact that so long as it continues to run there cannot be that possession of it which is essential to ownership. (83)

History

The origin of the doctrine of prior appropriation is a topic on which there is difference of opinion. Spanish settlers may have brought this doctrine into the southwest area, and the Mormons established a system of water titles in Utah that was appropriative in nature. In California, however, the doctrine had its beginnings in the water allocation customs of gold-seeking pioneers during the later 1840's and early 1850's. The unique characteristic of the doctrine of prior appropriation--the fact that the right is not incident to the ownership of land--stemmed from the water use demands of the mining activity and the semi-arid ambience within which such activity occurred. Furthermore, the miners themselves were not private landowners, but trespassers, "...possessing no proprietary rights in the public land, but...searching for and extracting the gold with the implied permission of the United States" (84).

When California became a state its supreme court, in the case of *Irwin v. Phillips* (85), approved the mining convention that a "...prior appropriator of water from a stream for the purpose of working a mining claim was protected against later appropriations" (84). The court reasoned that since

both parties were trespassers having no proprietary rights in the land, the doctrine of riparian rights could not be applied to control the disposition of rights in the water in contention. The extension of the appropriation doctrine to validate the priority of other, non-mining uses quickly followed the *Irwin* case (86). California's recognition of the doctrine was soon followed by other Western States who experienced, to a lesser degree, the same influx of mining interests.

During this early period of development in the West, mining firms and individuals, having established judicially their seniority in appropriation, became concerned that the opening of Federal land to private ownership would effectively deprive them of their appropriative rights:

> When the federal lands were opened to private acquisition by the Homestead Act of 1862, this possibility became a serious and immediate threat to the preservation of the system of appropriative rights that had heretofore prevailed, for riparian patentees could claim waters in the basis of land ownership according to the settled doctrine of the common law. (87)

In response to this concern Congress, in 1866, passed a statute related to mining on the public domain, which provided that:

> [W]henever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws and decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same.... (88)

The United States Supreme Court, in two subsequent cases, interpreted the statute as adopting the doctrine of prior appropriation and establishing pre-existing rights, rather than granting new rights in water (89). Moreover, Congress, in an Act of 1870 (90), explicitly provided that all patents issued after that date should be subject to the rights recognized by the Act of 1866 and that no patentee of Federal lands could defeat such rights by assertion of a riparian claim derived from the Federal grant (91).

As the Western territories and newly emerging states gained in population, it became increasingly evident that certain preferences in water use allocation had to be established. Thus, in 1877, Congress enacted the Desert Land Act (92):

> [W]ith the primary objective of providing for reclamation of desert land on the public domain in the West. It gave to anyone entering upon this land the right to appropriate enough water to reclaim 640 acres of arid land. In addition, it provided that all unappropriated water of nonnavigable waterways on the public domain 'shall remain and be held free for the appropriation and use of the public for irrigation, mining and manufacturing purposes, subject to existing rights.' (93)

In *California-Oregon Power Co. v. Beaver Portland Cement Co.* (94) the Supreme Court clarified the import of the Desert Land Act provisions by holding that the statute was not intended to apply only to desert lands, but rather to all of the public domain located within the boundaries described in the statute; and that the statute severed the water from such lands, leaving all unappropriated nonnavigable waters free for appropriation by the public in accordance with the established local laws of the territories and states affected. As to the establishment of rights in water, therefore, a United States patentee in public land had to look to the applicable local law. This meant that in some parts of the West, the law of waters was to become a somewhat uneasy marriage of riparian rights and appropriative rights, while in other parts, appropriative rights occupied the whole field (95). What developed as a consequence of this local control over acquisition of water rights were two basic doctrinal variations of the appropriation theory--the California and the Colorado doctrines.

The Colorado doctrine was based on the theory that the Federal government's proprietary rights in water were not part of the transfer of sovereignty to the Western States (96). Therefore, the control over all "natural streams" belonged to the states as property of the public. With this authority, the Western States following this theory could determine just what legal doctrine would apply to the acquisition of water rights:

> [T]he common law doctrine of riparian rights is unsuited to semi-arid conditions and never obtained in a State such as Colorado; that the United States in its proprietary capacity has no rights not accorded to private landowners, and therefore no grantee of the United States can have riparian rights, which never existed in the jurisdiction. (97)

The states applying the Colorado doctrine are the eight arid, interior states--Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. They all construed the Act of 1866 and subsequent Federal legislation pertaining to water as declaring the existing law rather than creating a new kind of water right. In these states, therefore, rights to use the water of natural watercourses do not generally accrue to the owners of riparian land solely because of their location next to the water. There are some cases in these states that recognize some aspects of riparian rights, such as the common law riparian rights regarding accretions (98) and fisheries (99). Also, in these states occasional decisions imply that riparians may use water benefically by virtue of their riparian status so long as they do not interfere with appropriative rights (100). On the whole, however, in the Colorado doctrine states riparian rights are not a substantial part of the state water laws.

Unlike the states that adhere to the Colorado doctrine, the states following the California doctrine recognize a dual system of water rights, riparian and appropriation, although the relative importance of the riparian doctrine varies from state to state. This doctrine is applied in the generally less arid Western States--California, Kansas, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas, and Washington. The theory upon which the California doctrine is based is summarized as follows:

> [T]he United States as the original owner of the public domain possessed the common-law rights of a riparian proprietor and the right to appropriate stream waters resulted from a grant at first implied and later specifically stated in congressional legislation. A grant of public riparian lands when made without reservation, gave the patentee riparian rights which were superior to any appropriation which was subsequently made and inferior only to appropriations made while the land was publicly owned. (101)

It must be noted, however, that the similarity between the laws of the respective California doctrine states is limited to the recognition of a dual system of water rights; beyond that point the water laws and administrative procedures governing the acquisition of rights in water differ markedly among these states. California and Texas are the two states that most often recognize riparian rights as important adjuncts to the appropriation doctrine (102). Oregon and Washington, at the other extreme, while acknowledging the historical origins of the riparian doctrine, no longer attribute much significance to its principles in respect to state water law (103). In the other five California doctrine states, riparian rights are still significant, but only in certain situations. The legislatures of many of the California doctrine states have greatly restricted the impact of the riparian doctrine by means of their state water codes; the legislative emphasis has always been on actual uses rather than on abstract relationships.

LAW OF NATURAL WATERCOURSES

Description

The concept of a natural watercourse is slightly broader in appropriation states than it is in riparian states. Although the original judicial definitions were similar, the requirement found in riparian states, that water must usually flow by a regular channel having a bed with banks and sides, has been eliminated by the water codes of a number of appropriation states. South Dakota, for example, defines a "natural watercourse" as follows:

> If the surface water in fact uniformly or habitually flows off over a given course, having reasonable limits as to width, the line of its flow is, within the meaning of the law applicable to the discharge of surface water, a watercourse. (104)

Thus, included in the definition of natural watercourses in many appropriation states are such water-related physical phenomena as arroyos, gulleys, draws, coulees, canyons, and ravines.

It should also be noted that the appropriation doctrine applies only to waters, and not to any wastes added thereto. Hence there can be no liability if a land application system diverts *wastes* from a natural watercourse. Possible liability for diversion of *water*, however, depends on the relation of two factors: (1) what is the priority relationship of the parties

involved; and (2) is a preferred use involved in the controversy?

The doctrine of prior appropriation has as one of its basic tenets the right to appropriate for beneficial use only that quantity of water which the appropriator "...first subjects to appropriation, except that he may also include an additional amount to meet increased needs which are within the scope of his 'original intent' if such amount is put to use within a reasonable time" (105). Almost all the states applying the appropriation doctrine have established standards of measurement in terms of a second-foot, and acre-foot, or a miner's inch (106). Any surplusage is subject to the claims of junior appropriators. Clearly, then, if a diversion of water from a stream does not effect the quantity that is the right of other appropriators on the stream to draw, then there has been no injury to these appropriators and no cause of action.

If, however, the diversion of water from a particular stream also depletes the flow sufficiently enough to abridge the right in quantity of other appropriators, then, whether or not a cause of action exists in favor of the injured appropriators depends on whether the diversion was by right of preference as established by the various state water codes. Preference involves a constitutionally or statutorily established order of beneficial appropriations of water, such as for "...irrigation, manufacturing, industrial purposes, municipal needs, domestic consumption, and stock watering" (107). This concept leads to four basic limitations on the priority principle:

> (1) Preferences to municipalities and governmental subdivisions; (2) Preferences for changes to preferred uses even when a water shortage exists; (3) Preferences between pending applications; and (4) Preferences which are created when the supply of water is not sufficient to satisfy all interested parties but are not confined to any defined groups or parties. (108)

Theoretically, a true preference is a species of "absolute" right that would allow the preferred use to be exercised without regard to other classes of users or their priority rights and without payment of compensation. Most Western States, however, deal with "qualified preferences," acknowledging the need to promote certain kinds of water use development, but also requiring that compensation be paid to those appropriators who are affected by the exercise of such a preferred use.

The majority of the appropriation doctrine states allow no one an unqualified right to appropriate water:

> A general rule in the appropriation-permit states is (1) that to be approved, an application for a permit to appropriate water must conform to the specific requirements of the statute; but (2) that the application must be denied (a) if there is no unappropriated water available in the proposed source or (b) if the granting would threaten the stability or value of pre-existing water rights, or (c) if the proposed project appears inimical to

> the public welfare. It is also a general rule that the administrator may grant a qualified or limited right consonant with the statutory restrictions. (109)

The passing of statutory provisions establishing preferences in the issuance of water use permits for the appropriation of water stemmed from the realization that indiscriminate appropriation of water in a predominately arid climate would result in a dangerous imbalance, allowing non-domestic uses to impair the appropriation of water for preserving human life.

Thus, the resolution of the question whether a downstream appropriator will have a cause of action against the party diverting water from the stream depends on two interrelated factors: (1) the priority relationship of the parties involved; and (2) the preference placed on either of the two appropriations. If the diversion is made pursuant to statutorily recognized procedures and is a preferred use, the individual suffering a depletion in the amount he was authorized to draw from the stream has a right to compensation. Obviously, if the diversion of water has priority over the downstream appropriator's use, the existence of a cause of action depends on whether or not the downstream appropriator draws water under a preferred use superior to the upstream diversion. If such a situation exists, the downstream appropriator has a cause of action against the diverting party for infringement of a vested right. If it is simply a priority relationship without consideration of preference and the diversion is senior to the lower appropriator, then no cause of action exists.

A second major question that must be considered is whether, in a case of pollution or contamination of a watercourse by an upstream user, a downstream prior appropriator of this watercourse would have a cause of action. The law in the Western States on this question is very similar to the law stated in riparian theory jurisdictions; that is, the lower riparian owners have a right to receive water from the stream in "...such a state of natural purity as to substantially fulfill the purposes for which his appropriation was made" (110). Early court decisions in appropriation states dealing with pollution recognized that if a stream was going to be put to its maximum beneficial use a certain depletion in water quality was inevitable. The settled law now is that the appropriator is entitled to protection against acts that materially deteriorate the quality of the water for the uses to which he wishes to apply it:

> A prior locator cannot insist that the stream above him shall not be used by subsequent locators or appropriators for mining purposes, and that the water shall flow to his claim in a state of absolute purity. While the subsequent locator will not be permitted so to conduct his operations as to unreasonably interfere with the fair enjoyment of the stream by the prior locator, or to destroy or substantially injure the latter's superior rights as a prior locator, nevertheless, the law recognizes the necessity for some deterioration, which, within reasonable limits, is *damnum absque injuria*. Any other rule might involve an absolute prohibition of the use of all the water of a stream above a prior locator in order to preserve the quality of a small portion

taken therefrom. (111)

This general rule applied both ways on the hierarchy of appropriation priorities. The title and rights of a senior appropriator of water are not absolute, but are conditional in that he is obligated to so use the water that subsequent junior locators might receive the balance of the stream free from pollution and fit for uses to which they might desire to put it (112).

Other aspects of the cause of action for polluting water of a natural watercourse are similar to the elements of the cause of action in riparian states. It is generally held that the injury must be substantial before a cause of action will lie, with the question of injury being one of fact:

> What diminution of quantity, or deterioration in quality, will constitute an invasion of the rights of the first appropriator will depend upon the special circumstances of each case, considered with reference to the uses to which the water is applied. A slight deterioration in quality might render the water unfit for drink or domestic purposes, whilest it would not sensibly impair its value for mining or irrigation. In all controversies, therefore, between him and parties subsequently claiming water, the question for determination is necessarily whether his use and enjoyment of the water to the extent of his original appropriation have been impaired by the acts of the defendant. (113)

If a substantial injury has resulted from the pollution of the stream by a senior or junior locator, the remedies available to the party injured are injunctive relief and/or money damages. Relevant considerations in determining just what remedy a court will give to the plaintiff are summarized by the United States Supreme Court:

> But whether, upon a petition or bill asserting that his prior rights have been thus invaded, a court of equity will interfere to restrain the acts of the party complained of, will depend upon the character and extent of the injury alleged whether it be irremediable in its nature, whether an action at law would afford adequate remedy, whether the parties are able to respond for damages resulting from the injury, and other considerations which ordinarily govern a court of equity in the exercise of its preventive process of injunction. (114)

Consequently, injunctive relief will be refused if the plaintiff's position will not be improved and the defendant will be harmed. In general, the factors considered by appropriation theory states in determining what relief to allow are the same as are considered by riparian theory states, and will not be repeated here.

Obviously, there is no unlimited right to pollute, and in the case where a preferred use is causing the pollution, considerations of preference are applied only to the type of relief granted to the injured party. It is certain that the landowner who allows contaminants to flow into a nearby stream will be held legally responsible to compensate those who have legally

recognized rights to the waters of the stream and who can prove that they have been damaged by the pollution.

Implications for Land Application Systems

The law of most appropriation states makes no provisions for a preferred method of land application of wastes. The major concern of the law governing water use is that any proposed diversion must be made for a beneficial purpose.

Any of the major types of land application systems could have either or both of two possible effects on natural watercourses:

1. By collecting wastes which may previously have been discharged into natural watercourses, the system will alter the pattern of flow of the body of water into which the wastes would have been discharged in the absence of the land application system. Basically, the system may improve the quality of the water but decrease the flow beneath the previous point of discharge and wastes.

2. After the wastes are collected, treated, and applied to the land under any of the application methods, trace contaminants may remain which may then drain into a natural watercourse. Such drainage may occur into either the original watercourse from which the wastes were diverted or into a different body of water. Although the amount of remaining contaminant may vary with the type of application method, the care with which the effluent is applied, the characteristics of the soil and other factors, the legal principles and their implications remain the same in any case. The result in a given case, however, might vary with the severity of the pollution caused by the trace contaminants.

With regard to the first effect of an application system on a watercourse, it is clear that the rules of "priority" and "preference" will have the following implications:

1. Since the vast majority of natural watercourses in the Western States already have existing appropriative activity, it is clear that a diversion system for land application on a particular watercourse will be subject to water quantity limitation imposed by the mere fact of the pre-existing water use right.

2. Moreover, even though the land application system will likely be considered irrigation and thus have preference over a majority of other uses (except domestic uses) the concept of priority will impose implied limitations on water quantity, since compensation will have to be made to pre-existing uses if the land application use affects the ability of those uses to appropriate their necessary amounts of water.

In an effort to minimize interference with other appropriative rights and avoid liability for damages, the following steps should be taken in the

institution and operation of a land application system:

1. In establishing sites for land application systems, consideration should be given to the nature of the uses of the water occurring downstream from the point of diversion. Most importantly, in arid or semi-arid states, consideration must not only be given to the stream on which the land application will draw, but also to any stream to which the former is tributary. Liability to other diversions not on the particular stream from which the waste system draws, but which are on streams to which the stream in question is tributary, can be had if the diversion causes an appreciable drop in quality and quantity on the latter watercourse.

2. In establishing sites for land application systems, consideration should be given to the volume of flow of the stream or river from which diversion will be made. The same diversion may tremendously affect the quantity of flow on a small stream but have only a marginal impact on the quantity of flow on a large stream.

3. If diversion of wastes will occur from a natural watercourse care should be taken to insure that as much of the water as possible is either left in the water course or if removed, returned at or near the point of original diversion.

The second way in which the law of natural watercourses intersects with land application systems is when, after application, trace contaminants remain on the land and are eventually washed into a natural watercourse. Such a result will not always occur; the nature and quantity of trace contaminants remaining after application will be a function of the method of application and skill with which it is applied. If, in a particular situation, some contaminants drained into a natural watercourse, then the following consequences may ensue.

Since an appropriator's right to use the waters of a natural watercourse is not absolute, there can be liability for pollution of those waters. This liability also extends to stream waters to which the former stream is tributary. Money damages and injunctive relief are available to the injured parties, but it is unlikely that a "beneficial" use such as land application of waste (irrigation) will be enjoined. However, money damages will be assessed for any proven injury.

If an application system was being carelessly run, causing pollution that could be avoided by careful operation, then, of course, an injunction against the careless operation might ensue. But if the system is being carefully run, and if the only pollutants returning to natural watercourses are those unavoidably remaining after treatment and application, then it is unlikely that the entire application system would be enjoined from further operation.

Generally the law in Western States concerning the quality of the water in a natural watercourse is more liberal toward beneficial uses of water than the law of most riparian jurisdictions. Not only are the "equitable"

defenses, such as "laches," "balancing of the equities" and "coming to the nuisance" as likely to be recognized in a western court as in an eastern one, but also the influence of the appropriation doctrine causes a greater emphasis in favor of beneficial uses which may cause trace contamination of the watercourse. However, any user of water could be held liable for provable damages caused by water pollution if the amount of the discharge is so substantial as to interfere with other uses of water. Since most western courts have found pollution of public streams to be equivalent to the taking of a property right, it is clear that if any substantial pollution were caused by a land application system, which caused provable harm to a downstream appropriator, that harm would have to be compensated regardless of the "priority" or "preference" relationship.

In establishing sites for land application systems, consideration should be given to whether the desired method of application will cause a greater residue of pollutants than would occur with a different method of wastewater management. Consideration should also be given to whether there is a watercourse located close enough to the application site to occasionally receive trace pollutants. If a watercourse is so located, consideration should be given to the nature of the uses occurring downstream, the quality and flow of the watercourse, and whether any of the downstream uses would be harmed by any likely trace pollutants. A few Western States require monitoring of nearby watercourses for parameters such as pH, BOD, suspended solids, and fecal coliform bacteria. Some of these regulations will be specified in Volume II of this report.

LAW OF SURFACE WATERS

Description

The definition of surface waters is basically the same in appropriation states as in riparian states. However, since appropriation states have a broader definition of a natural watercourse, surface waters will lose its character as such more quickly than in riparian states. Also, most Western States presume that all waters are tributary to some stream or stream system, with the person trying to establish their character as surface waters having the burden of proving that fact (115).

Civil Law Rule--

The basic legal structure of surface water law in appropriation states is similar to the structure in riparian states. The law pertaining to attempts to alter or prevent the flow of surface water is divided into two categories, the "civil law" rule and the "common enemy" rule. Both rules are frequently modified by a reasonable use limitation that is often treated as a third separate rule by riparian jurisdictions. The civil law rule has been defined as follows:

> The prevailing doctrine appears to be that when two fields are adjacent and one is lower than the other, the owner of the upper field has a natural easement to have the water that falls upon his land flow off from the same upon the field below, which

is charged with the corresponding servitude. (116)

However, there is a strictly applied limitation on the upper landowner's so-called easement; that is, he cannot in any way collect, channel, or augment this flow so as to unduly burden the servitude in the lower landowner's property. In other words, the easement applies only to waters naturally flowing from the upper to the lower tract.

The seven Western States that adhere to the civil law rule--California, Colorado, Kansas, Nevada, Oregon, South Dakota and Texas--have all modified its import, as evidenced by the South Dakota statute which states:

> Owners of land may drain the same in the general course of natural drainage, by constructing open or covered drains, discharging the same into any natural watercourse or into any natural depression whereby the water will be carried into some natural watercourse...and when such drainage is wholly upon the owner's land he shall not be liable in damages therefore to any person. (117)

This provision has been interpreted as allowing the owner of the upper land tract to build canals to drain off water into a natural watercourse provided he does not permit an accumulation of water on his property and cast the same on the servient land in unusual or unnatural quantities.

The converse of the foregoing rule is that the servient estate cannot bar the natural flow of surface water so as to adversely affect the dominant estate owner's right to enjoyment of his property:

> The owner of the lower, or servient, estate must receive surface water from the upper, or dominant, estate, in its natural flow. While the owner of such upper land has a right to drain and dispose of surface water on his property, he may not concentrate such water and pour it through an artificial drain in unusual quantities and in greater-than-normal velocity upon a lower landowner's property. (118)

As noted, the several Western States applying the civil law rule all recognize numerous modifications of that rule. Colorado, for example, restricts changes in drainage conditions made by the upper landowner to those that do not result in any more harm than was experienced by the servient estate under "natural circumstances" (119). The most frequent modification, however, is to engraft a "reasonable conduct" requirement on the operation of the civil law rule:

> We find the law in California, both as to urban and rural areas, to be the traditional civil law rule which has been accepted as the basis of harmonious relations between neighboring landowners for the past century. But no rule can be applied by a court of justice with utter disregard for the peculiar facts and circumstances of the parties involved. No party, whether an upper or a lower landowner, may act arbitrarily and

unreasonably in his relations with other landowners and still be immunized from all liability.

It is therefore incumbent upon every person to take reasonable care in using his property to avoid injury to adjacent property through the flow of surface waters. Failure to exercise reasonable care may result in liability by an upper to a lower landowner. It is equally the duty of any person threatened with injury to his property by the flow of surface waters to take reasonable precautions to avoid or reduce any actual or potential injury.

If the actions of both the upper and lower landowners are reasonable, necessary, and generally in accord with the foregoing then the injury must necessarily be borne by the upper landowner who changes a natural system of drainage, in accordance with our traditional civil law rule. (120)

The issue of reasonableness of conduct is a question of fact, including among its considerations the harm done to others as weighed against the actor's interest. Also relevant to the issue of reasonableness are "...the amount of harm caused, the foreseeability of the harm which results, the purpose of motive with which the possessor acted..." and all other pertinent facts relating to the conduct in question (121).

The "reasonable conduct" modification is not limited in application to the civil law rule; "reasonableness" has also been applied by various appropriation state courts to modify the import of the common enemy rule. As in riparian states, the "reasonable conduct" limitation has taken on a rule status of its own in some cases:

...[T]he reasonable use rule differs markedly from the strict civil law and common enemy rules, in that each possessor of land is legally privileged to make a reasonable use thereof, even though the flow of surface waters is altered thereby and causes some harm to others, liability being incurred only when his harmful interference with the flow is unreasonable under the circumstances. This rule often does not purport to lay down any specific rights or privileges. Each case is usually decided on its own facts in accordance with pragmatic concepts of fairness and common sense. (122)

Common Enemy Rule--

The other major rule found in Western States is the common enemy rule. This rule, also referred to as the "common law" rule by at least one state (123), regards surface waters as outlaw or common enemy waters, against which every proprietor of land may defend himself even to the consequent injury of others (124). Western States following the common enemy rule include Arizona, New Mexico, Montana, Nebraska, North Dakota, Oklahoma, and Washington.

As in riparian jurisdictions the essence of the common enemy rule is that the lower landowner owes no duty to the upper landowner to refrain from

obstructing the flow upon his land; and each of them may in the improvement of his premises, by embankments or otherwise, prevent any portion of the diffused surface water from flowing upon his land. As is true of the civil law rule as well, the modifications of the common enemy rule applied by Western States deal primarily with recognizing a reasonable use concept.

Use of Surface Waters--

In Western States as in Eastern States, the various rules relating to surface waters are principally concerned with what landowners can do with unwanted surface waters. The Western States have built up a considerable body of law to deal with the problems of drainage of such waters, but have "...comparatively little [law] on rights to their retention and use" (125). Thus, if an adjoining landowner asserted damages because of trace pollutants discharged into surface waters by a land application system, the issue would be resolved substantially the same as in riparian jurisdictions. Where the claim, however, is that an upper landowner is diverting and using surface waters which the lower landowner would like to receive, as in riparian states, we are faced with a lack of authority on the precise issue. However, where the riparian states tend to equate such a lack of authority with the lack of a cognizable right in the lower landowner, it is possible in the appropriation states for a lower landowner to argue that he has a prior appropriative right in the wanted surface waters.

In California, for instance, one case makes reference to the question of whether or not appropriative rights can be established in surface waters, and impliedly supports the concept:

> It is not perceived why surface water from rains and melting snow, which naturally drained into this ditch (though not the subject of appropriation) to the extent to which it adds to the quantity of water which was received into the ditch from Connor's Creek does not add to the value of the ditch, nor why its loss does not cause injury. (126)

Hutchins, however, argues that riparian rights, recognized in California, may not attach to diffused surface waters because of the limitation that such rights attach only to land adjacent to watercourses and diffused surface waters do not meet the requirements of a watercourse (127).

In Montana, the law is clearer, and allows for a landowner to appropriate all the diffused surface water that falls on his property (128). Consequently, a lower landowner has no objection if an upper landowner uses the diffused surface water that comes on to this property. Nebraska and Oklahoma law support the Montana holding, and in the case of Oklahoma, which also recognizes riparian rights, it has been held that "...a lower landowner has no riparian right to the surface water of another" (129). South Dakota is also in accord and their supreme court summarized the state's existing law on the right to use diffused water by stating:

> No riparian rights attach to surface waters, nor does the arid region theory of appropriation apply thereto. There is no right on the part of a lower proprietor to have surface water flow to

his land from upper property. A landowner is entitled to use surface water as he pleases so long (and so long only) as it continues in fact to come upon his premises. He may drain or divert the same or he may capture, impound, and use it in such fashion as he will, provided only that he does not thereby create a nuisance or unlawfully dam back or cast the waters upon the land of another. (130)

The general tendency, then, in the appropriation states is that the landowner has ownership or right of control of the diffused surface water that occurs on his land. This result is the same that is reached in all riparian states. The states of Utah and Texas provide the clearest exceptions to this general trend. Under the Utah statutory amendments of 1935, "...declaring all waters in Utah, whether above or under the ground, to be public property, subject to all existing rights to their use, it would appear to be reasonably certain that the landowner has no inherent right to use diffused surface water by virtue of his ownership of the land." (131) Texas, on the other hand, has a statute providing that "...storm, flood or rain waters of every river, natural stream, canyon, ravine, depression or watershed, within the State of Texas are hereby declared to be property of the State..." and is subject to appropriation (132). The Supreme Court of Texas has held that landowners using such waters prior to the enactment of this statute have a vested right therein, and that the statute does not change the character of this right (133). That right, however, is limited only to the water on the proprietor's land and once it enters a watercourse it becomes the property of the state.

In summary, then, the issue of a land application system's possible liability for trace pollutants making their way into surface waters after application will be resolved substantially the same in appropriation states as in riparian states. The issue of a land application system's diversion of surface waters that would otherwise have passed on to lower lands may or may not be resolved the same as in riparian jurisdictions. In those appropriation states which either do not recognize a right of prior appropriation of surface waters, or give primacy to the landowner on whose land they fall, the subsequent lack of judicial authority indicates that the lower landowner has no legally recognized right to insist that the surface waters keep flowing. But, in those Western States that do allow prior appropriation of surface waters--most notably Utah and, to some degree, Texas--then it is possible that a lower landowner might have established a prior appropriative right before upland diversion for on-land application began. Resolution of such an issue would then be comparable not to riparian state surface water law, but to appropriation state natural watercourse law.

The law of surface waters in Western States can best be summarized as follows:

1. As to diversion of tributary flows of surface waters, the principles of prior appropriation developed in the natural watercourse context will apply.

2. As to diversion of non-tributary flows of surface waters, occasional

statutes such as Colorado's Livestock Water Tank Act (134) mandate concern for other uses of such waters, even though such flows are not historically subject to the prior appropriation doctrine. Unlike the situation that exists in riparian states, in some Western States a landowner's right to use surface waters crossing his land is not absolute. Therefore, in establishing a land application system, the same basic considerations discussed in the natural watercourse section will be appropriate.

3. Questions of pollution of surface waters, whether tributary or non-tributary, are resolved in the same manner in Western States as are issues of pollution of natural watercourses. Even in non-tributary situations, damages may be assessed for adversely affecting other property owners and water uses. Therefore, the suggestions pertaining to possible trace pollution of natural watercourses in Western States will be equally applicable here.

Implications for Land Application Systems

The law of surface waters in all Western States makes no distinction between the several different types of land application systems. The case and statutory law is primarily concerned with the right of one landowner to control and utilize the flow of surface water across his lands and those contiguous thereto.

Any of the several types of land application systems may have the following effects on the natural flow of surface waters in the area of the application site:

1. After the treated effluent is applied to the site for irrigation or other purposes, trace contaminants may remain, which may then be carried off the site with surface waters, such as precipitation, and which may cause the pollution of those surface waters when they cross onto other lands. More important, however, is the presumption in most appropriation states that all surface water is tributary to a stream. With that burden added into the considerations herein, it is important that the land application system take note of the surrounding topography so as not to interfere with stream appropriators depending on local surface water run-off to maintain the stream flow. Furthermore, steps must be taken to avoid excessive pollution of surface water flows tributary to local streams so as to avoid possible liability for damages to local stream appropriators.

2. If, on the other hand, precautions are taken to retain trace pollutants after application within the perimeter of the application site, surface waters such as precipitation also necessarily will be retained at the application site, and will not flow across adjoining lands as they had prior to institution of the land application system. If containment of surface run-off is a design goal, it must be remembered that in Western States the presumption is that all surface flows are tributary to stream systems. The system operators

would bear the burden of proof to establish otherwise in any particular case, in order to allow impoundment of those waters. In those cases in which the burden is sustained, the water may be impounded without risk of liability in all but a few appropriation states.

In both of these situations the major factor distinguishing Western law from Eastern law is the presumption of the tributary nature of the surface water in question. This presumption, and the overcoming of it, will limit the extent to which any land application system will be allowed to impound or otherwise affect the flow of surface water coursing across the land chosen as the application site.

Although most Western States have no explicit statement directed to the pollution of surface waters, the mere fact that they are usually considered to be tributary flows implies that any pollution thereof is actionable by appropriators on any particular stream affected. Thus, a land application system is met with two barriers not present in riparian states in trying to establish a site upon which to operate. First, the system cannot impound waters that are tributary to any stream so as to avoid the flow of pollutants into that stream, if the stream has previously established diversion works and the impoundment will affect their duties. Second, even if the surface water is proven to be non-tributary, there is still the possibility that the water is already being used by an appropriator in those states in which surface waters may be appropriated, and consequently pollution or diversion of that water is actionable by the prior appropriator injured thereby.

Moreover, if the surface water finds its way into an underground stream or adversely affects underground waters, which are also presumptively tributary, the possibility exists that the land application system could be liable both to appropriators utilizing groundwater sources affected or to surface stream users which are injured by the previously contaminated groundwater finding its way into the natural stream upon which they have established their diversion works.

In establishing land application systems, consideration should be given to prevailing surface water patterns, including topographical studies, precise locations where surface waters are likely to flow, locations of springs, water supply wells and buildings on adjoining lands, and specifications of any adjoining land and stream uses that might be harmed by either the interruption of surface water flow or the addition of trace pollutants. This initial perusal will also determine the likely direction of flow of surface waters and whether or not such waters are tributary to natural watercourses.

Consideration must also be given to the pertinent regulations of the few Western States which specifically regulate land application. Some of these regulations will be specified in Volume II of this report. It should be noted, however, that the aspects of land application pertaining to surface water patterns that are most frequently regulated include size of buffer zones, alternate distribution of effluent to different sections of the system, and the nature of the vegetative cover.

The basic surface water law of the Western States is not as favorable to

the institution of land application systems as is the surface water law in riparian states. This is because of the narrower scope of the surface water definition, and the possibility, in several Western States, of there being appropriative rights in surface water. Whereas a land application system in a riparian state can solve its surface water problems by simply detaining all surface waters at the application site, this alternative will not always be possible under the laws in the Western States. In some topographical situations it may be difficult to establish a land application system without interfering with pre-existing rights in surface waters, while in other topographical situations there will be no greater problem than in riparian states.

LAW OF GROUNDWATER

Description

Statutes in the majority of the appropriation states have made all groundwater subject to appropriation (135). Thus, in these states the law governing watercourses applies to the use of groundwater and the legal questions with regard to groundwater will be answered substantially the same as they were answered in the natural watercourse area. However, some appropriation states still make a distinction, common in riparian states, between water in definite underground streams and percolating waters. These states apply their appropriation theories only to the former bodies of water, and in these states, despite their status as appropriation states, issues pertaining to percolating waters may be resolved substantially as they would in riparian states.

The Western States which do not apply appropriation theory to percolating waters are:

1. Texas, and possibly New Mexico, which appear to follow the English rule of absolute ownership (136);

2. Arizona, Nebraska, Washington, and Wyoming, which follow the rule of reasonable use (137);

3. California, which is unique in applying a rule of "correlative rights," discussed later in this report; and

4. Hawaii, which has recognized a distinction between groundwater flowing in definite channels and percolating waters, but only applies limited aspects of the appropriation doctrine to groundwater in channels, and has not stated which rule it would apply to percolating waters (138).

All other Western States apply the appropriation theory to all underground water, whether or not it is located in an underground stream.

As to waters in definite underground streams, that is water underground in a constant stream in a known and well-defined natural channel, however small, but reasonably ascertainable from the surface, without excavation

(139), the law pertaining to watercourses is applied in all appropriation states. But as to waters that do not conform to any particular underground channel, such as percolating waters, the rights to use them rest upon some variation of any of three bases--prior appropriation, the English rule of absolute ownership, and the American rule of reasonable use.

In the majority of appropriation states, however the appropriation doctrine is equally applicable to percolating waters. That is, ownership of percolating water is in the state, and use of the water is available to those who comply with state law relating to prior appropriation. The first appropriator will be protected against a subsequent appropriator whose conduct impairs the supply of water as it existed at the time of the first appropriation.

In California, a special rule known as the "doctrine of correlative rights" has been applied to percolating waters. California law relating to natural watercourses is partly riparian in theory and partly prior appropriation, and the doctrine of correlative rights was created in an effort to attain uniformity in the state's water law. In *Katz v. Walkenshaw* (140), the plaintiff was using his land for farming, including making use of the underlying percolating water. The defendant began pumping huge quantities of water from wells on adjacent lands to sell for public consumption. This use, by drying up the plaintiff's wells, lessened the agricultural value of the plaintiff's land. The court could have enjoined the defendant's conduct under a reasonable use theory (141), but the court, in *dictum*, set forth two additional fact situations: (1) where both claimants are using the water outside the basin, and (2) where both claimants are using the water on land overlying the basin. After doing this the court then stated that, where outside uses were concerned, an analogy should be drawn to the appropriation doctrine, thus protecting the first taker; but that, where overlying uses were concerned, there should be proration of waters: (1) as between those transporting for use beyond the overlying land where the right is only usufructuary and priority of appropriation applies; and (2) as between an appropriator transporting beyond the overlying land and one using the water on overlying land. Two situations arise in the latter instance. One is where the landowner was using the water before the appropriator began and so the landowner's rights are paramount to the extent of the quantity necessary for use on his land and the appropriator may take the surplus. A second situation is where the appropriator was using the water before the landowner's use began and so the landowner's rights are restricted to the quantity necessary for use. Where two overlying landowners are competing for a limited supply of water, both are to be given a fair and just proportion (142).

As between an appropriator who commenced his groundwater use prior to use by an overlying owner, it has been held in California that the overlying owner's rights to the quantity of water necessary for use were unaffected by the fact his use was commenced after the appropriator's use had begun (143). Later cases have held that the concept of priority is not a consideration in establishing the rights between overlying users in the same groundwater (144).

The proration theory thus constitutes an application of riparian law to percolating waters, and in effect places a quantitative limit on the rights a user would enjoy under the reasonable use doctrine. Although it was first stated as *dictum* in *Katz*, it has since become the law of California (145). No other Western State, however, follows this view. A few decisions approve it in *dicta* (146), but all states that have considered adopting the view have rejected it (147). These rejections have been based upon the substantial administrative problems that would be involved in determining the proportionate interests of overlying landowners, and also because states that have rejected riparian law regarding natural watercourses would usually have no reason for adopting what is almost a riparian theory for percolating water.

In conclusion, it is difficult to generalize about how the appropriation theory states would resolve the issues of possible raising of groundwater levels. In those states that hold all groundwaters to be subject to appropriation, the issues would be resolved as each of those states resolves similar issues involving natural watercourses. In those states that apply either the English rule of absolute ownership or the American rule of reasonable use, the issues will be resolved the same as riparian theory states would resolve them. The issues would be resolved in California by applying the doctrine of correlative rights.

Implications for Land Application Systems

In none of the Western States does the law concerning groundwaters distinguish between the different types of land application systems. Instead, the law is primarily concerned with whether or not the groundwater in question is tributary to a natural stream, or (in the majority of Western States) subject to appropriation as a non-tributary water source.

Any of the major types of land application systems could, in certain cases, have the following possible effects on groundwater supplies:

1. After application of treated effluent at the application site, trace contaminants may remain which may then seep into underlying groundwater supplies and perhaps cause trace pollution of those supplies. Similarly, the trace contaminants may also seep eventually into natural watercourses to which the underlying groundwater supplies are tributary.

2. After application of treated effluent at the application site, remaining liquids, whether burdened with trace contaminants or not, may seep into underlying groundwater supplies and raise the water table of the particular groundwater supply. This added water could be beneficial to users of the groundwater supply, but in some circumstances it could interfere with surface drainange of other lands.

In either of these possible situations, the implications for land application systems of the groundwater law of the Western States will vary with the basic rule adopted by the particular state. In the minority of Western States that apply either the absolute ownership or the reasonable use rule to percolating waters, the implications are the same as in riparian states, and so

will not be repeated. California probably should be included within this group of states, as its "correlative rights" doctrine is most closely related to the reasonable use rule. The only difference common to these Western States, as opposed to the riparian states, is that in most of them it is presumed that underground waters are part of or tributary to a natural watercourse until the opposite is proven, whereas in riparian states the legal presumption is frequently the precise opposite. Therefore, a given source of water is somewhat more likely to be classified as part of a natural watercourse in the West.

In the majority of Western States that apply the appropriation doctrine to all underground waters, the legal implications are different than those pertaining to groundwaters in riparian states. They are, instead, comparable to the natural watercourse legal structure in the appropriation states. While this structure places land application in a strong legal position, with numerous defenses available should any litigant allege any harm to a water supply, there are a few differences in treatment which flows from the presumption of the tributary nature of groundwaters, which should be mentioned briefly.

As noted, most Western States, whatever their basic groundwater rule, presume that all groundwaters are tributary to natural watercourses. This presumption can raise a number of problems in those states following the appropriation doctrine for groundwaters. First, claims of priority will have to be considered not only in respect to non-tributary groundwaters, but also, under the statutes of several states (148), to local surface stream appropriators to which the underground water is tributary. Second, if the groundwater becomes polluted, surface stream water users as well as groundwater appropriators will have a cause of action against the land application system causing the pollution. While the legal implications of such an action are no different than that already discussed with regard to natural watercourses, the number of possible claimants is broadened. Third, the burden of proof in trying to establish the fact that a particular underground water source is not a tributary of some local stream is met only by "clear and convincing" evidence. The difficulty of meeting this burden obviously depends on topography, soil conditions, subterranean rock structures, and the proximity of other natural watercourses, among other factors.

In establishing land application systems, considerations pertinent to groundwaters would include the nature and location of any groundwater supplies in the area, the depth of the water table (and seasonal variations), the usual direction of groundwater flow, and the uses generally made of such water in the surrounding area. Several Western States have regulations aimed at protecting groundwater supplies from possible pollution. Among the topics regulated by particular state regulations are volume of application, alternate distribution of effluent to different sites, and groundwater monitoring for parameters such as organic nitrogen, ammonia nitrogen, nitrite and nitrate nitrogen, chlorides, sulfates, dissolved solids, alkalinity, hardness, and pH. Some of these regulations will be specified in Volume II of this report.

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GLOSSARY

appropriation: The doctrine applied in the 17 contiguous Western States and Alaska, under which one's right to use water is not based on ownership of land on the bank of a watercourse, but on a prior appropriation of the water. To constitute a valid appropriation there must be an intent to apply water to some beneficial use, a diversion of the water from the natural channel, and an actual application of the water within a reasonable time to a beneficial purpose.

diffused surface water: In most states, this term is used interchangeably with "surface water" and has no independent meaning. The cases of a few states use the term "surface water" to encompass all waters on the surface of the land, including waters in surface watercourses. In these states the term "diffused surface water" carries the meaning ascribed to "surface water."

groundwater: Water beneath the surface of the earth that does not flow in a well-defined channel and is not confined to a well-defined bed.

natural flow: A branch of the riparian theory of rights to water in natural watercourses. Under the natural flow theory, a riparian landowner has the right to the water of the watercourse in its natural condition, undiminished in quantity or quality, except for only "natural" uses, such as domestic by upstream riparians. The riparian landowner, in turn, may only make "natural" uses of the water, in order to preserve it for the riparians located still farther downstream.

natural watercourse: In addition to the definition specified for a watercourse, a natural watercourse is a watercourse formed by the natural flow of water as determined by the conformation of the surrounding country, as distinguished from an "artificial" watercourse formed by the work of man, such as a ditch or canal. Many states, however, specify that artificial waterways can acquire the status of natural watercourses after the passage of several years, if there has been reliance by the affected parties on the flow of the water.

percolating water: In most states this term is used interchangeably with "groundwater" and has no independent meaning. A few states, especially in the West, use the term "groundwater" to include all water beneath the surface of the land, including water in underground watercourses. In these states, "percolating water" carries the meaning ascribed to "groundwater."

reasonable use: A branch of the riparian theory of rights to water in natural watercourses. Under the reasonable use theory, a riparian landowner has the right to make reasonable beneficial use of the water. This may include uses beyond "natural" uses, such as irrigation or manufacture, but this right is subject to the right of other riparians, both upstream and downstream, to also make reasonable beneficial use of the water.

riparian rights: The rights of the owners of land on the banks of watercourses to use the water of those watercourses. These rights exist in the 31 Eastern States which follow the riparian doctrine. Generally, riparian rights include the use of the water for "natural" purposes, such as bathing and domestic use, and for some "artificial" purposes, such as irrigation, watering of livestock, and manufacture. The scope of the permitted "artificial" purposes will depend, in a large part, on whether the particular state applies the strict "natural flow" or more liberal "reasonable use" theory of riparian rights.

surface water: Water on the surface of the land that does not flow in a well-defined channel and is not contained in a well-defined basin. Such water ordinarily results from rainfall and melting snow as it spreads over the earth's surface, and retains its character as surface water until it reaches a watercourse or seeps into the ground.

watercourse: A body of water which flows in a known and defined channel located either on the surface of the earth or beneath the surface. The general category includes both lakes and streams that meet the frequently stated criteria of having a definite course or channel, a substantial current, a definite source of supply, and an outlet into another body of water.